Faculty of Computer Science And Information Technology

Online Simulator of Learning Package for Networking Subjects

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This project (wxes3182) is submitted to
Faculty of Computer Science and Information Technology
University of Malaya
In partial fulfillment of the requirement for the
Bachelor of Information technology Degree

ACKNOWLEDGEMENT

First and foremost, I would like to extend my sincere appreciation to my supervisor, Dr. Mazliza Othman. Thanks for her guidance, valuable advises and instruction, opinion and thoughtful contribution throughout this project.

Secondly, I would like to take this opportunity to express my gratitude to Mr. Noor Zaily Mohammed Noor for sparing her precious time to be my moderator.

For special mention, I would like to express my sincere gratitude to my project team member Mr. Ly Chung Cheong and my coursemate Mr. Raymond Wang in sharing thoughts and knowledge. Your patience, constructive criticism and suggestions were essential and mush appreciated.

A highly appreciate to Mr. Hans Khor who is so kind to provide, offer and supply the material such as the reference books for me to accomplish this project.

Last, but not least, I intend to do dedicate to my family members and friends who have supported me. I am indebted and grateful to all of them.

ABSTRACT

The growth of internet and multimedia services gave an impact to the student's life nowadays, a book with printed study material are no longer enough and has ultimate effective in learning process. With the ease of the internet, Information can be delivering fast and effectively. A web based as simulator is one of the solutions for educational purpose over the Internet.

Online Simulator of learning Package for Networking Subjects is developed as the steps towards developing an E-Learning system for networking subjects. This system enables user learn the networking subjects via flash animation, sounds effect, and interactive with the multimedia elements. Besides, user can go through the quizzes and games provided in the system to test their understanding on networking subjects.

This system includes the design and implementing the multimedia based lessons. The package is rich in multimedia, colorful pictures and animation. This will help the user complete understanding of the networking concept. This will be an effective learning tool for students to learn the networking subjects. It also can help lecturer in their teaching process, work as an extra tool to assist in curriculum.

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CHAPTER 1
INTRODUCTION

Chapter 1: Introduction

1.0 Overview

Online simulator of learning package for networking subjects is a web based system ease teaching and learning for both lecturers and student of FSKTM. The simulator provides a multimedia teaching and learning environment, to assist user to have a good understanding on networking subjects.

The simulator enables students to obtain their study material easily, anywhere, anytime with just a few clicks. The online simulator not only provides a center for students to learn their lessons online, but also to test their understanding via the quizzes or games easily and effectively; therefore students can check their progress and understanding. User can read and update themselves with the latest technology of networking online, and get helps from the help tools provided.

The online simulator increases effectiveness to the teaching and learning process, this may be a useful tool for the user to be more understanding on the networking subjects.

Besides, this simulator is designed in multimedia environment, it is an element to keep user feel interesting and attractive during learning progress. With the usage of the simulator, user can achieve a better result in networking subjects. The simulator as the lesson provided to the user, and the quiz and game will assist user to test their understanding regarding networking.

1.1 Project Motivation

Networking is a very popular field and students with strong knowledge of networking are much sought after in the job market. Therefore, we need to make sure that students have appropriate tools while they are taking networking courses in FSKTM. The faculty offers the WXES 2106 Teknologi Rangkaian course which covers the basics of networking. Since students a required to learn many concepts of networking, it is feasible for provide standard and reliable tools to help them learn more in an effective way.

1.2 Project Objectives

The main objectives of the project are:

- To provide lessons related to the current lectures. The lesson will be designed by using multimedia tools to make it more interesting so that users can understand easily with assistant of the graphics designed.
- To provide a self test on networking concepts before they sit for examination. This helps students to be more confidence in answering question during the exam.
- To provide a game playing environment to achieve study goal. The game will be designed with the purpose of to test the understanding of user to networking subjects.
- To provide a teaching tool that can be used to assist teaching

- To promote active learning rather than passive learning. Student are more self-motivated to gain knowledge, and have more time to spend on it with networking assignment.
- To promote cost effective learning as users just need to login to the website and obtain the information and study material from the site.
- To be provide an additional source for students to gain more knowledge and latest news of technologies of networking. Students can always keep themselves updated with the latest networking technology.

1.3 Project Scope

The simulator consists of different teaching modules that will be incorporated into a simple learning package which relates dynamically to each other. Individuals using this learning package will be able to access the lesson module, quiz module, game module, terminology module and help module via the main menu.

This learning package will be developed according to the following parameters:

- To create learning tool for networking's subjects.
- To create an interactive user guide for the study networking's subjects.

The learning package consists of 6 main modules, i.e. the lesson module, quiz module, game module, terminology module, information module and help module. The syllabus for the lesson module is:

1. Open Systems Interconnect Reference Model
2. TCP/IP

3. Virtual Private Network (VPN)
4. Virtual Local Area Network (VLAN)
5. Multiplexing
6. ISDN and ATM

1.4 Report Layout

This layout gives an overview of the phases involved during the development of this project.

Chapter 1: Introduction

This chapter gives views description about the project background, objective of the project, project scope and project features.

Chapter 2: Literature Review

This chapter discusses the authoring tools system web application and multimedia presentation skills used to design and develop the system.

Chapter 3: Methodology

This chapter discusses the methodologies, techniques and tools that are adapted to develop this simulator.

Chapter 4: System Design

This chapter explains the proposed system. This includes architecture design, database design, functional design and user interface design.

1.5 Expected Outcome

Expected outcomes of online simulator of networking subjects for this project include:

- Simulator controlling panel – user to control the running of simulator
- Result publishing panel – key-in results, and updating the result.

- Online test preparation panel – to prepare online test for true or false and multiple choices question.
- Online test regulation panel – to set the instruction and regulation of the test and set the time limit.
- Online test statistics panel – auto-generated statistical report of test taken.
- Student management panel – to manage the students who participate the site.
- Announcement panel – to make announcements by electronic notice board and mailing list.
- Students' login panel.
- Information downloading panels.
- Result viewing page.
- Taking online quiz and game.
- Electronic notice board.

1.6 Project schedule

The project carried out through the period from beginning of July 2003 until end of January 2004. We will develop the system according to a project timeline as guideline, whether we could finish the task right on time. A project timeline was planned to manage the times and accomplish the implementation of this project as below:

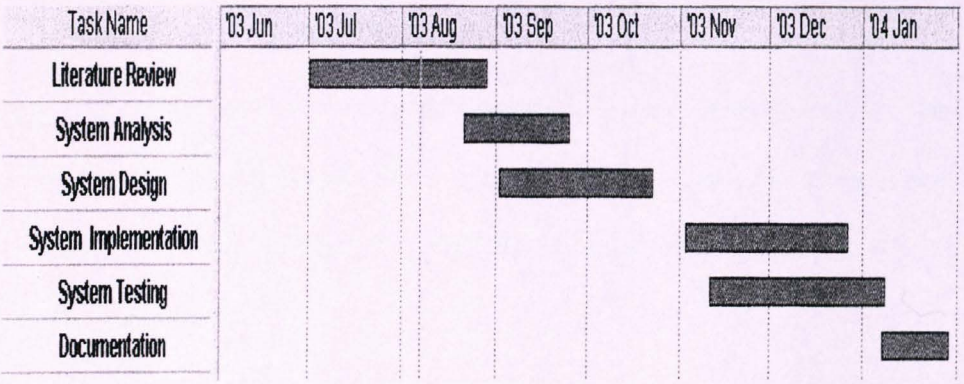


Figure 1.1 Project Schedule

1.7 Chapter Summary

In short, online simulator of learning package for networking subjects provides an excellent knowledge in networking concept, especially for the beginners who want to know more about networking. This chapter introduces the overview and objective of project, project scope, project schedule for the entire system development. This project is targeted to be the first choice for the user as learning tool for networking subjects.

CHAPTER 2

LITERATURE REVIEW

Chapter 2: Literature Review

This chapter discusses the authoring system and the tools used to develop the simulator of this project. The study and comparison of existing systems are covered in this chapter. The web programming tools and database connection are also considered.

2.1 Authoring System

An authoring system is a program with preprogrammed elements for the development of interactive multimedia software titles. Authoring system vary widely in orientation, capabilities and learning curve. Since authoring a programming language, a user needs to understand how programs work. Authoring tools are very useful and important in developing the front and ends of an application. It is a user-friendly working interface with internal interface for accepting external media, input source, a facility to import text, graphics, draws, paint capabilities, animation, audio, video manipulation and editing function. Before creating a system, it is important to evaluate the possible authoring tools in order to provide the best performance. Among the selected authoring tools are Flash 5.0 and Dreamveawer MX

2.1.1 Authoring Methodology

There are a few methodologies used by authoring tools:

- Scripting language
- Iconic/Flow control
- Frame
- Card/Scripting

- Cast/Sure/Scripting
- Hierarchical object
- Hypermedia linkage
- Tagging

2.2 Multimedia Authoring Tool

The development of the simulator needs multimedia design tools to meet the goal of the simulator as a attractive study guide to the user. the selected tools are Macromedia Flash 5.0 and Dreamveawer 4.0.

2.2.1 Macromedia Flash 5.0

Flash is the standard for interactive vector graphics and animation for the web. Web designers use flash to create beautiful, resizable and extremely compact navigation interfaces, technical illustrations, long-form animations, and other dazzling effects for their site. Graphics and animation will anti-alias and scale based on the viewer's screen size, providing high quality viewing.

Flash advances web animation with transparency and shape blending effects. New movie chip and button actions create sophisticated interactivity without scripting. Improved interface design and functionality makes Flash easy to use.

2.2.1.1 Advantages of Flash 5

From a technology standpoint, Flash offers an unique combination of quality, performance and compactness along with built-in support for animation and interactivity. The key attributes of the Flash technology are:

- **Fast:** The render in Flash has been optimized to deliver anti-aliased static and animated vector graphics to the screen faster then traditional graphics engines draw aliased graphics.

- **Compact:** The Flash vector is a binary format design from the outset to be as compact as possible to minimize network bandwidth requirements. Flash file are small, even when animation play back in full screen. In addition, Flash includes support for streaming, which means Flash files can play while they download. There's no wait even with slow modem connections.

- **Interesting design:** Designed as a display format, Flash features support for anti-aliased text and graphics, meaning that all letter and image edges are smooth, even while animating. Besides, Flash support graduated fills and transparency, which are essential for the creation for distinct, high impact graphics.

- Interactive: Flash is the premiere tech for creating multimedia interfaces for the web. Features button objects, an event handling model (mouse up, mouse down, mouse over, etc) and a built in set of actions (get URL, load URL, stop, play, goto frame, etc). Together with these features give user interface designers tremendous flexibility in the creation of highly interactive user interface.

- **Platform independent:** In addition to the inherent device independence offered by a vector format, Flash is uniquely capable of outputting fully self contained platform independent files without any dependencies on external resources such as fonts.

- **Animation support:** Flash support timelines, which enable the creation of both simple and complex path and sprite based animation. Sequences using the flash authoring tools, animators can create everything from flying logos and headlines to full blown streaming cartoon animations.
- **Bitmap support:** Flash features support for both JPEG and PNG images; enabling authors to include bitmap elements within their flash based content. Flash also supports bitmap interpolation/smoothing to retain quality when an image is scaled or rotated.
- **Audio support:** The Flash file format supports the inclusion of AIFF and WAV audio samples. Taking advantage of the audio capability, designers can accent their user interface designs and include audio tracks in their animation sequences.
- **Extensible:** The Flash file format is a tagged format, a characteristic that will permit macromedia and the community of platform vendors and tool developers who support the open format to add new capabilities to future versions of the player and authoring tool, while maintaining backwards capability with older players.
- **Player ubiquity:** The opportunity for Flash developers is defined by the size of the installed base of pc browser and internet devices that include a Flash player. Macromedia has done an outstanding job of ensuring that Flash has the largest installed based possible and is available across the broadcast range of internet platforms possible.

- **Compact, portable and fast player:** The Flash player has been designed to be as small and portable as possible to ensure rapid proliferation across a broad range of browser or operating system. The average size of the Flash download package is 100K. The performance of the Flash player has also been optimized for the rapid display of both static and animated images.
- PC browser support: Flash is available for personal computers across the full range of leading pc browser.

2.2.1.2 Disadvantage of Flash 5.0

Flash 5.0 is a resource hog. RAM is a premium when creating and running, and a fast processor is good to have to run it at an acceptable rate. Another concern when using Flash is that while authoring, lots of screen real estimate is very nice in order to have many windows open.

2.2.2 Macromedia Dreamweaver MX (Web Design)

Macromedia Dreamweaver MX is a professional visual editor for creating and managing web sites and pages. It gives developers productivity of visual web page layout tool, the controls on HTML text, editor and support for new web technologies, all in one of software packing.

Developers can use it to create web sites visually, with confidences that HTML being generated is concise and always editable. It includes an advanced feature that takes advantage of the latest innovations on the web, such as dynamic HTML and CSS, while still ensuring that web pages work well in a variety of web browsers. All of the code generated by it is carefully created to work on as many platforms and browsers as possible.

Others features include easy integration of Active X components, Java applets, Plug-ins for improved web page interactivity. It also integrates seamlessly with other components of Macromedia, such as Flash Movies, Shockwave, and Fireworks, which are essential for the development of interactive web pages.

2.3 Types of multimedia information

Today's computer based multimedia system integrated the following types of information:

2.3.1 Text

Multimedia systems use text because it is an efficient way to communicate with other and provide instructions to the user. There are 5 types of text, i.e. printed, scanned, electronic and hypertext.

2.3.2 Graphics

A picture is worth a thousand words. Graphics often appears as backdrops behind text to create a pictorial framework for the text. Pictures can also serve as icons, intermixed with text, representing options that can be selected or can appear full screen in a place of text.

2.3.3 Sound

Sound objects play important role in multimedia applications. There are three types of sound that can use in multimedia productions, i.e. Midi sound tracks, waveform audio and compact disc audio. Midi stands for instrument

digital interface. It provides a very efficient way of recording the performance information required to play music. Every sound has a waveform that describes its frequency and amplitude. All recorded music is available on audio compact disc in computer addressable form. An audio CD can hold up to 75 minutes of high fidelity recorded sounds.

2.3.4 Video

Video provides a rich and lively resource for multimedia applications. There are four types of video that are used to link objects in multimedia application, i.e. live video feeds, videotape, videodisc, and digital videos. Live video feeds provide interesting led-time objects of multimedia links. Any television channel or live camera feed can be the object of the link.

The most widespread video medium is videotape. It can be the objects of multimedia links. However this medium is limited by two factors. First, videotapes are linear; second, most videotape players are not computer controllable.

Digital video is the most promising and exciting video storage medium; it is stored in files on hard disc or CD ROMs. It can be serve over computer networks.

2.3.5 Other authoring tools:

The other editing tools being used are:

- CorelDraw
- Adobe Photoshop
- Adobe premiere

- Macromedia director
- Macromedia fireworks
- Adaptec EZ CD creator
- Real jukebox

2.4 Existing System Review

There are two existing system discussed to review the strengths and limitation of simulator and learning package in multimedia environment.

2.4.1 Case study 1: Cisco E-learning program

Cisco is one of the worldwide recognized networking standards on hardware products and professional certification. It provides online learning program with interactive presentation. Cost effective online learning and communications are helping Cisco's partner in building their competitive in the knowledge based economy.

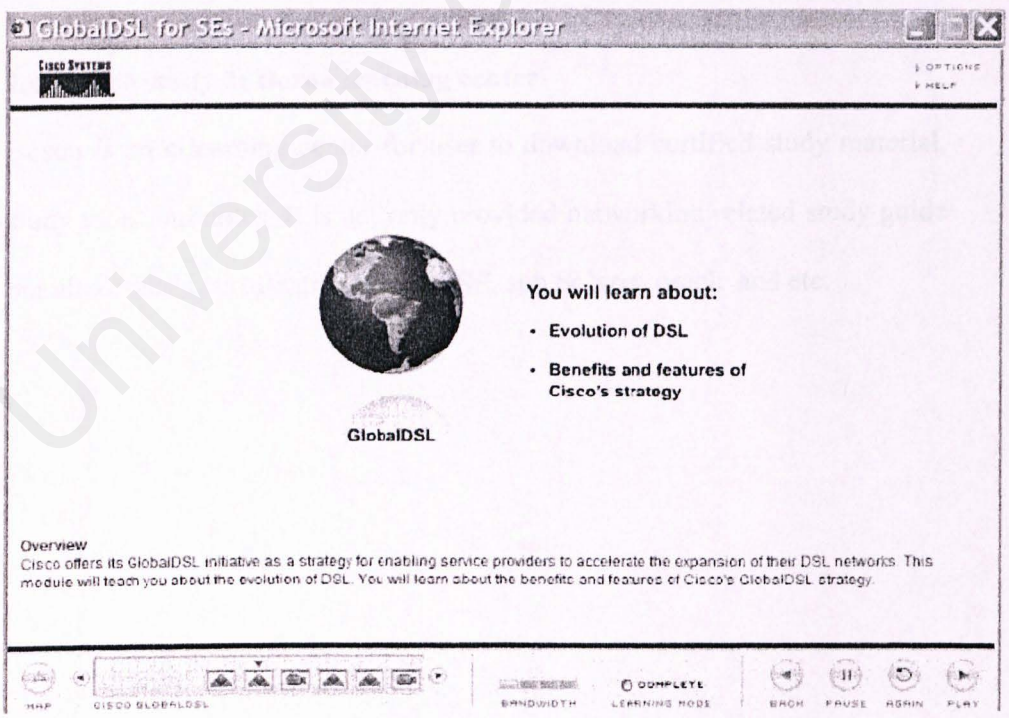


Figure 2.1 Interface Design of Simulator by Cisco

Strengths:

- Provide an interactive study guide for user
- User friendly design with clear layout of the interface.
- Combination of graphics and 3d elements makes the presentation attractive.

Limitation:

- This kind of simulator provided by Cisco is only available while user login, and only certain individual or company with relevant requirement is authorized to login.

Compare the strengths and limitation of Cisco's learning program, it is rich with good and standard study material, but it needs higher level of understanding that may not suit to the user in this project. This is because Cisco user is more belongs to the group of technical person in networking, with skills and technique in networking products provided by Cisco.

2.4.2 Case study 2: Boson learning center

Boson is an e-learning center for user to download certified study material, study tools and notes. It is not only provided networking related study guide but also other's certification like MCSE, sun Solaris, oracle and etc.

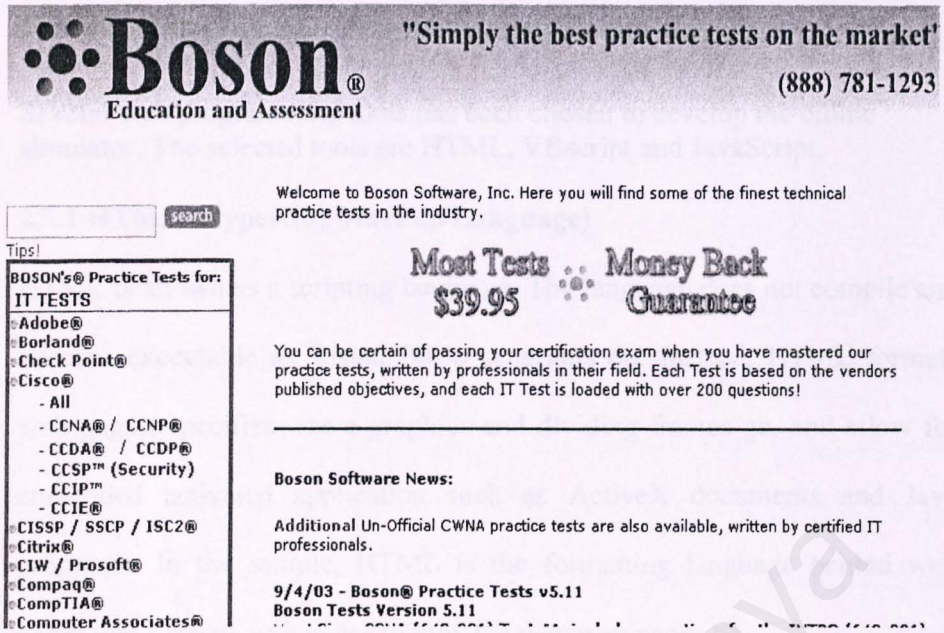


Figure 2.2 Interface Design of Boson e-learning site

Strengths:

- User do not need to login to get those material.
- The study materials are standard and recognized.
- User can access the trial version of the quiz design by boson.

Limitations:

- Some advance materials are chargeable.
- Poor design on the interface of the webpage and the study guide.

Boson provides a very convenient study center for those who want to save money on buying books or taking courses, some free study guide and notes, or e book are downloadable via boson; but boson still consider as commercially for our user in this project.

2.5 Web Application Programming Technology

Several web programming tools has been chosen to develop the online simulator. The selected tools are HTML, VBscript and JavaScript.

2.5.1 HTML (Hypertext Markup Language)

HTML is known as a scripting language. The language does not compile and become executable as Visual Basic programs do. Instead, HTML formats web pages, specifies where graphics and dividing frames go, and allow for embedded activated application such as ActiveX documents and Java programs. In the sample, HTML is the formatting language behind web pages that formats web pages to look the way web pages do.

2.5.2 VBScript

VBScript, as the name implies, is another scripting language that was designed by Microsoft based on the Visual Basic programming language. VBScript is a fast, portable, lightweight interpreter for the use in World Wide Web browser and other applications that use Microsoft ActiveX Controls, Automation servers, and Java applets. VBScript can be embedded I the HTML pages to build the Web application.

VBScript is designed for use with Microsoft's Internet Explorer browser together with other programming hat can be run at the client side, including ActiveX Controls, Automation server, and Java applets, client-side scripting refer to script that can executed in the users' Web browser, the Web client, rather than the Wed server.

Unlike Java, VBScript and JavaScript code is represented as regular ASCII text within the HTML document. The VBScript code is interpreted and compiled while the browser is downloading it from a Web server. Besides,

the VBScript code is extremely easy to learn and use compare to Java and also JavaScript.

2.5.3 JavaScript

JavaScript is Netscape's cross-platform, object-based scripting language for client and server applications. JavaScript allows the applications that run over the Internet been created, which the client applications run in a browser and server applications run on a server. JavaScript is lightweight in that there isn't a great deal to learn. So, we can be productive with it very quickly, in contrast to much more complex languages such as Java. As a scripting language, JavaScript is meant to tell an application what to do. Unlike languages used to create applications, it cannot do anything without the application.

Using JavaScript, we can create dynamic HTML pages that process user input and maintain persistent data using special objects, files and relational databases. A JavaScript page, can validate the data entered before it is sent to the server. If the data is invalid, JavaScript can block transmission to the server. Because of this work is performed on the client side, JavaScript does not waste bandwidth transmitting bad data and then receiving an error page from the server.

2.6 Database Connection

The connections of database with the system are important to ensure the system running smooth on the web. There are two database system selected to suit the project's requirement.

2.6.1 Microsoft Access

Microsoft Access is a powerful database management system, which collects information related to a particular subject or purpose, such as tracking user's personal details. By using Microsoft Access, we can manage all the information from a single database file. Within the file, the data can be divided into separate storage containers called tables. Besides storing information, Microsoft Access provide extensive new features designed I development of Web Enabled application

Microsoft Access 2000 provides powerful new tools for sharing, managing and manipulating data. It shares our database with coworkers over an internet, find and retrieve information quickly and take advantage of automated, pre-packaged solutions to quickly create database.

2.6.2 Microsoft SQL Server

Microsoft SQL Server (MSSQL) is a multi-user relational database management system (DBMS) that runs on the Window NT operating system. The SQL server diver enables application to access data I Microsoft Server database. All the client workstations communicate with SQL Server across a network, such as Window NT Server, Novell, TCP/IP network and etc.

2.7 Chapter Summary

After having a look of all the required material, it gives a guideline and clear view on how to produce a multimedia-learning package for networking's subjects. Initially the outline of the content should be produce with a rough description of how the user interface should appear. The content should be interesting to categorize the learning process as well as sound and animation to make the presentation interesting and enjoyable. Expand the outline by producing a flow chart and develop the prototype to test the structure of the application will work is a must in order to smoothen the process design processes.

CHAPTER 3

METHODOLOGY AND SYSTEM ANALYSIS

Chapter 3: Methodology and System Analysis

This chapter discusses about the system methodology being used to develop the project Online Simulator of Networking Subjects, the functional requirement and non functional requirements are also described.

3.1 Project Methodology

It is important to have a good procedure of design process before starting any software development project. Effective development of a project depends on a thoroughly systematic planning progress of the project. System or software development generally takes the form of life cycle, i.e. the system development life cycle (SDLC). All systems go through the same generic stages in their lifetime. The stages are:

- Feasibility study
- Analysis and requirement specification
- Design
- Implementation
- Maintenance

The methodology or software engineering models use in Online Simulator for Networking Subjects project is Waterfall Model with prototyping. The research and development of Online Simulator for Networking Subjects will be in progress throughout two semesters.

3.1.1 Research and Analysis

Several resources have been uses in the process of gathering useful information for the project, there are several resources have been use, such as brainstorming among team member, internet surfing, revision of books from library, and documents review at document room of FSKTM.

3.1.2 Methodology - Waterfall Model with Prototyping

The Waterfall Model with Prototyping is chosen because the strengths of both the Waterfall model and prototyping can be combined in a single project. The prototyping method help to gain user requirement from the user and Waterfall Model supports interactive design.

In the development of the project, the Waterfall Model will serve as the base for the whole development because the steps of it is very similar to the generic steps of software development process that are applicable to all software engineering paradigms. It also provides a template into which methods for analysis, design, coding, testing and maintenance can be placed. Prototyping is used in the early stages of the development where there was a high degree of uncertainty in several areas of user requirements. The emphasis of prototyping is on trying out and experimenting with ideas and experiment with user interface requirements and usability factors as well as providing assumptions about requirements.

Besides, it is not feasible for developers to journey through the entire Waterfall model to make enhancement. Below are the stages involved in Waterfall Model with Prototyping.

Step 1: Requirements

The system services, constraints and goals are established by consultation with system users. When applied to this project, the requirements are followed with the common requirement of student. The requirements need to be identified and consider.

Step 2: Design

The system design process partitions the requirements to either hardware or software systems, and establishes the overall system architecture. Software design involves representing the software system function in a form into one or more executable programs.

Step 3: Coding

During this stage, the system design is realized as a set of programs or program units. Unit testing on involves verifying that each unit meets its specification. This will involve the simulator and the website that should be already well designed.

Step 4: Testing

The individual program units or programs are integrated and tested as a complete system to ensure that the software requirements have been met.

Step 5: Operation

Normally this is the longest life cycle phase. The system is installed and put into practical use. Maintenance involves correcting errors which were not discovered in early stages of the life cycle, improving the implementation of system units and enhancing the system' s services as new requirements are discovered.

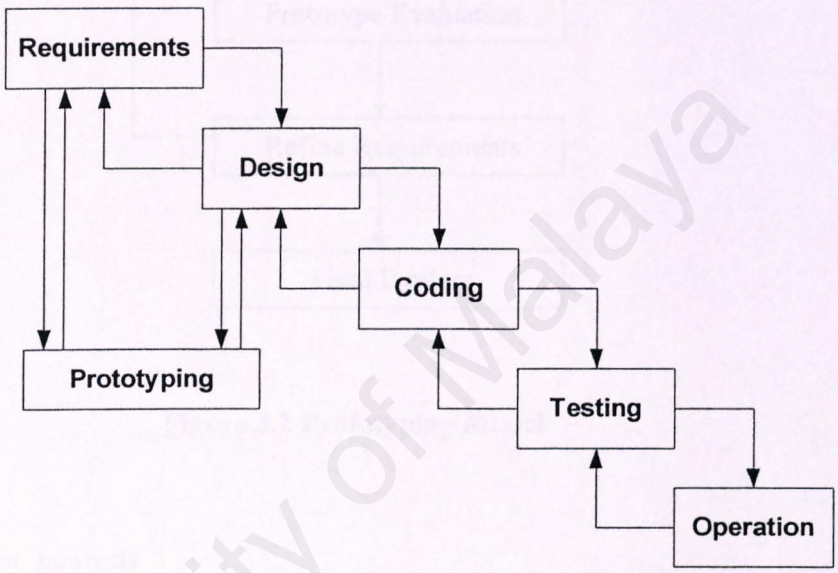


Figure 3.1 Waterfall Model with Prototyping

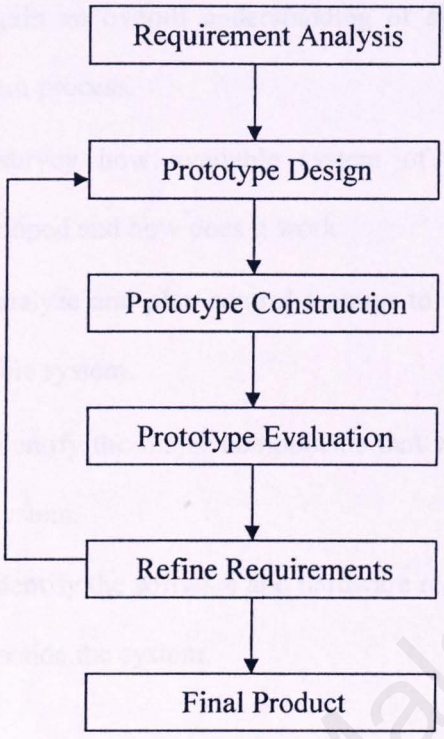


Figure 3.2 Prototyping Model

3.2 System Analysis

System analysis is an essential and important phase in software life cycle that is used to determine and to find out clearly what a system does and to analyze the system needs. It always starts with data collection. Several resources, such as library and bookshop, Internet, newspaper and magazines, and documents room at FSKTM were used to obtain information.

This phase usually requires a few days to complete The purposes of this analysis phase are:

- To acquire knowledge on how ~~does~~ a Online Simulator for Networking Subjects web application work.

- To gain an overall understanding of system data flow and system process.
- To survey how available system of this type had been developed and how does it work.
- To analyze and plan control features to develop a robust and reliable system.
- To identify the major components that will to be included in the system.
- To identify the software and hardware requirement to develop and reside the system.

3.3 Requirement Specification

A software specification definition is an abstract description of the services, which the system should provide, and the constraints under which the system must operate. There are two types of requirement analysis, functional requirement and non- functional requirement.

3.3.1 Functional Requirement

Functional requirements are statements of services the system should provide, how the system should react to particular inputs and how the system should behave in particular situation. In some cases, it also stated what the system should not do. Furthermore, it is independent from the implementation of the solution. There are six modules recognized as the most important functional requirements for this project:

- **Login module**

This module designed to let user to login to the website, and then use or download the materials from the website.

- **Lesson module**

Consists of 6 sub modules which are separated into different subjects. Each sub modules is designed as a simulator to present the concept of selected networking's topic.

- **Quiz module**

This module is designed to let user test their understanding about the lesson that they have done. It's in the form of objective question, some selections are provided, and user need to consider the best answer then finally the system will generate his/her submission of the answers.

- **Game module**

This module is designed to let user test their understanding via game. The Number of question is generated randomly each time a user logs in to play, and some help tools will be provided while users are playing and having difficulty.

- **Terminology module**

This module is an index with terms of networking. Users may use it whenever they meet a new word or terms used in networking.

- **Information module**

The information module is rich with updated and latest news about networking. When a user logs in to this website, he can gain the news and latest technology about networking. It helps users to keep up to date with networking's technologies.

The learning lessons should be easy to be learned and understood by the user in a short period. Animations will be added in order to make the sub system interesting and guideline to users learn the networking's concepts will be provided. The appropriate guide to convey learning material is through audio and animation, illustration, diagram and pictures will be descried and gave a clear explanation.

3.3.2 Non-Functional Requirements

Non-functional requirements are system constraints on the service or function offered. They include the system timing constraints, constraints on the development process or standards such as choice for constructing a solution to the problem. The non-functional requirements are:

- **User-Friendly Interface**

The system shall have an attractive and user-friendly interface, which can help reduce the learning curves. The user interface design principles such as user familiarity and consistency shall be taken into consideration. The usage of intuitive and meaningful menus and icons is required too.

- **Modularity**

The system is developed with a modular approach to ease maintenance and scalability of any modules in the system.

- **Reliability**

This system should be reliable and should not cause unnecessary downtime of the overall environment. It should have set up the acceptable failure rate. However, the system must be easy to maintain, simple and effective.

The system should be consistent when functioning. It should run smoothly although there are many web users using the system simultaneously. The system should not produce dangerous or costly failures when it is used in a reasonable manner.

- **Response Time**

All desirable information should be available to users at any point of time or reasonable time. The requirement for up-to-date or timely information is also important. Users should not be kept waiting for a long time for the output.

- **Expandability**

The system is able to enhance including adding new features, functionality, and volumes of product in the future time.

3.4 System Requirement

The requirements of the system need to be identify while the projects is running on. The future development is base on the requirement that predefine. This is to prevent the system can runs on the platform that suitable and supportable in hardware and software requirement.

3.4.1 Hardware requirements

- A computer with not less than 166Mhz processor
- At least 64 MB memory
- 4 GB of free hard disk space
- Network Interface Card (NIC)

- Other standard computer peripherals

3.4.2 Software Requirements

As a rundown from the previous conclusions, it is decided that this project will use:

- Microsoft Windows XP as the application platform,
- Microsoft Access as the database management system
- Microsoft Internet Explorer 5.0 as web browser
- HTML and JavaScript as client-side scripting
- Macromedia Flash 5.0 as design program for simulator
- Macromedia Dreamweaver 4.0 as website design tool
- Macromedia Fireworks as website design tool
- Macromedia Director 8.0 as website design tool

3.5 Chapter Summary

Methodology and system analysis are the most critical process of information system development. Using a good methodology, a plan can be drawn up to guide the development towards the project goals. However, system analysis is used to determine and to find out clearly what a system does and to analyze the system needs either is functional requirement or non-functional requirement.

The reviewing of the methodology being used, procedures that specify the system requirements in detail, analysis of development technologies will help in gaining the advantages and knowledge about the implementation of the proposed system.

The following chapter will discuss about the design of the system, which includes the system architecture review, description of system flow, description of database and interface design and other system components.

CHAPTER 4

SYSTEM DESIGN

Chapter 4: System Design

This Chapter will be focus on the designation of the system. It consists of system functionality, user interface and database design.

4.1 Introduction

System Design is a phase of the waterfall with prototyping that the entire requirements for the system are translated into system characteristics. The requirements for system are regarding to the analysis that had been discussed in the previous chapter. System design includes the following issues:

- System Conceptual Design
- System Functionality Design
- User Interface Design
- Database Design

4.2 System Conceptual Design

Structure charts will be used to show the outline of the system. The structure chart layout shows the structure where the package starts from main screen. There are 6 modules.

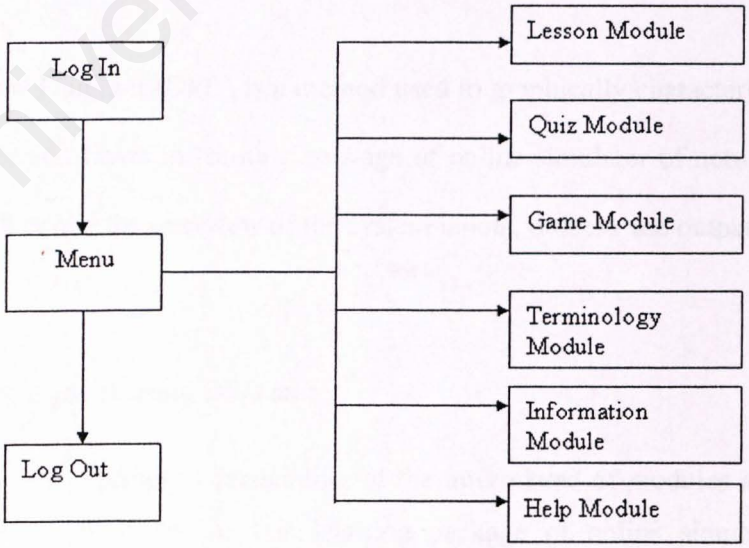


Figure 4.1 Systems Conceptual Design

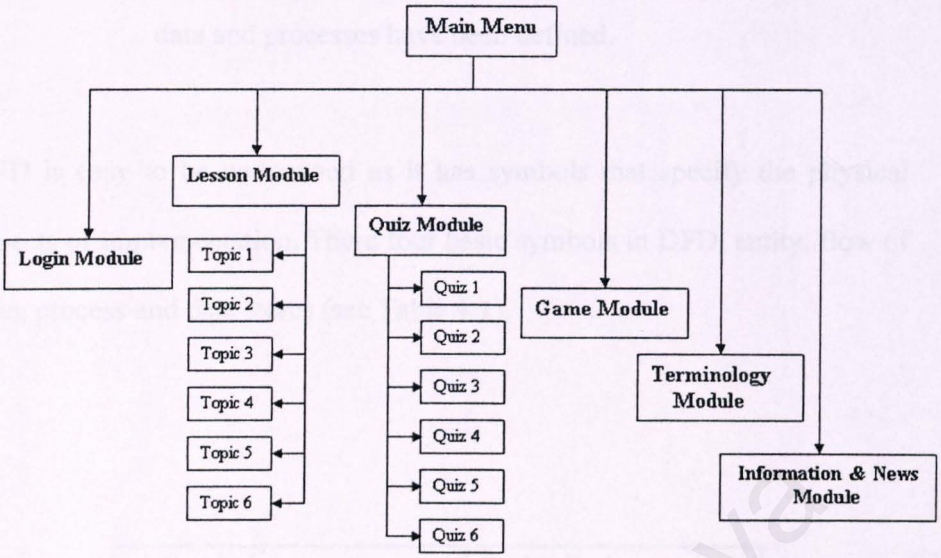


Figure 4.2 Main System Structure Chart

4.3 System Functionality Design

System functionality design discusses about the data flows of the system. The context diagram and the level zero diagram shows the flows of the data and functions of the system.

4.3.1 Data Flow Diagram (DFD)

Data Flow Diagram (DFD) is a method used to graphically characterize data processes and flows in learning package of online simulator of networking. DFD will depict the overview of the system inputs, process and outputs.

The advantages of using DFD are:

- Further understanding of the interrelated of modules and sub modules for this learning package of online simulator of networking.

- Analysis of a proposed system to determine if the necessary data and processes have been defined.

DFD is easy to be understood as it has symbols that specify the physical aspects of implementation. There four basic symbols in DFD: entity, flow of data, process and data stores (see Table 4-1).

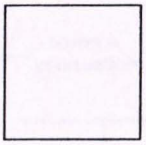
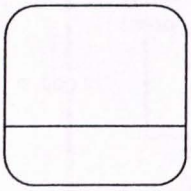
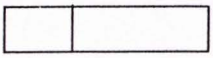
Symbols	Attribute
	Entity
	Flow of Data
	Process
	Data Store

Table 4.0: DFD Symbols

The convention, which is used to design DFD are based on the work by C.Gane and T.Sarson.[ref 1] The data flow is conceptualized with a top-down perspective. Therefore the Context Level Diagram will be drawn, followed by the Zero Diagram. Zero Diagram is an overview process of all the major modules in Online Simulator for Networking Subjects that includes all the data stores, entities and process involved

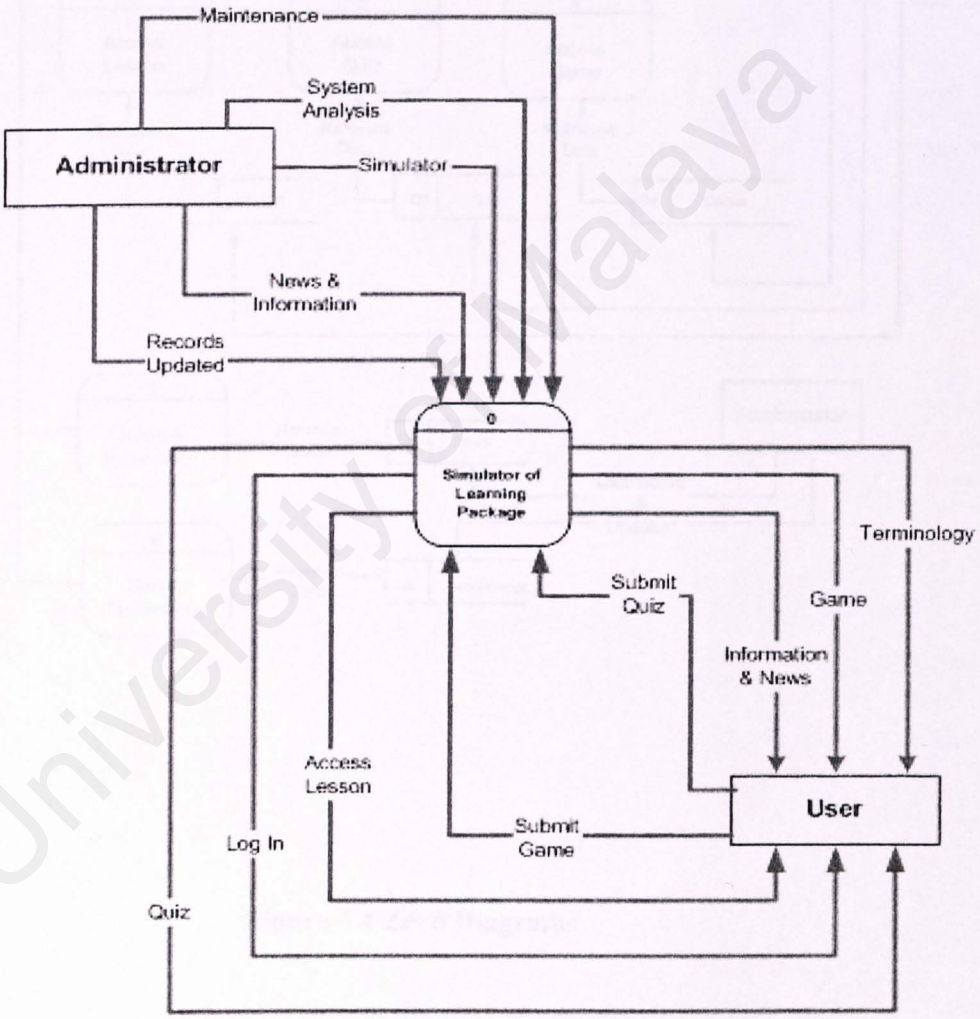


Figure 4.3 Context Diagram

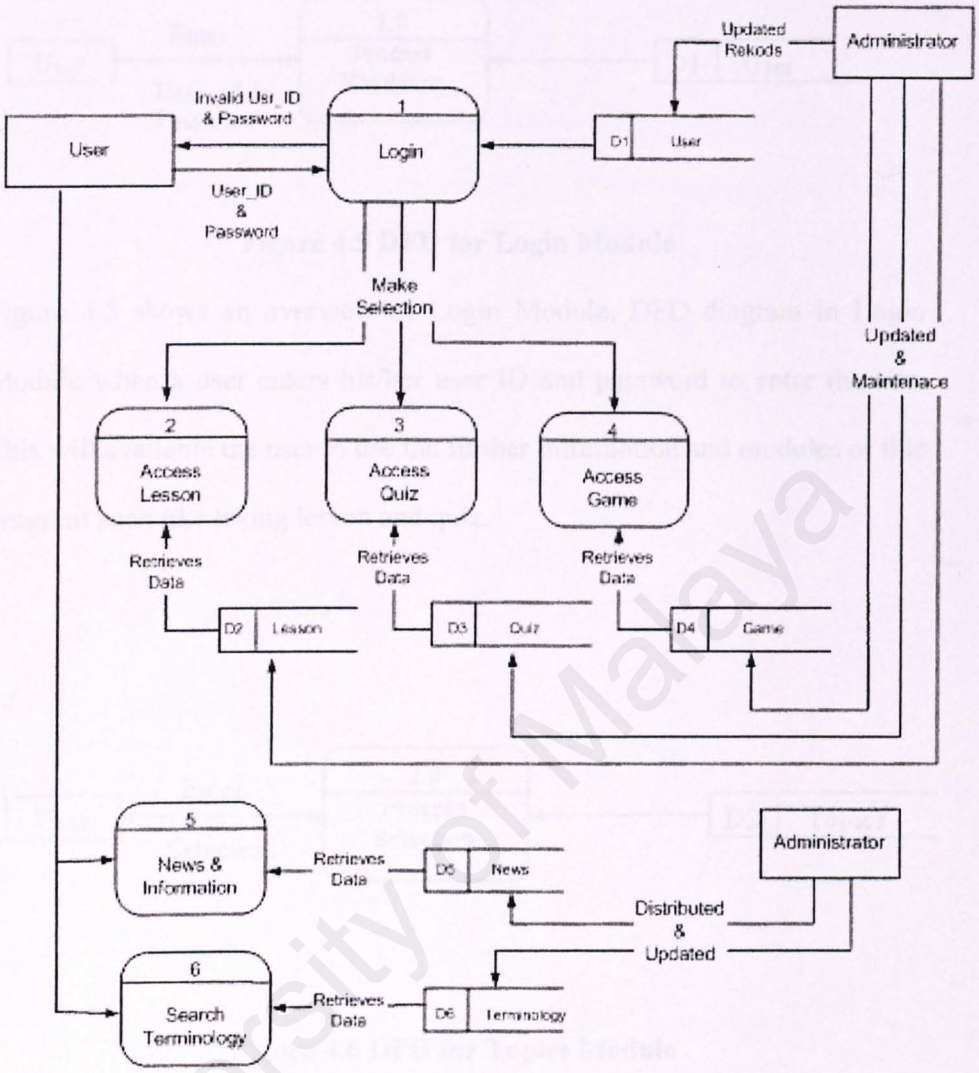


Figure 4.4 Zero Diagrams

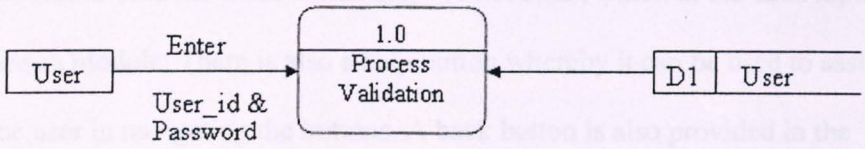


Figure 4.5 DFD for Login Module

Figure 4.5 shows an overview of Login Module. DFD diagram in Login Module when a user enters his/her user ID and password to enter the site. This will available the user to use the further information and modules of this program such like taking lesson and quiz.

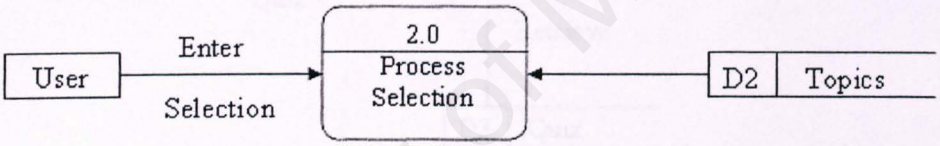


Figure 4.6 DFD for Topics Module

Figure 4.6 shows an overview of Topics Module. 1st level of DFD Diagram in Topics Module, a user can choose which ever topics they prefer to be viewed. From the main menu, the user can select any of the 6 topics to be view. For example if the user select the topic 1, this selection will then be processed. And the notes for the topics will be retrieved from the database know as topic database. Where else all the other text, graphics and animation will be stored on the CDROM itself. The users will always have the ability to quit the program whenever they want by just clicking the exit from the screen where they currently reading. The user can also select the terminology

module to find the term, which they are not clear, which in the each topic in lesson module. There is also a help button whereby it can be used to assist the user in navigating the buttons. A back button is also provided in the screen to ease navigation and to allow user the ability to traverse back and forth between the pages. At the end of this Lesson module, quiz and game will be included to test the user understanding on each topic. In this section, the result and answer of the quiz and game will be prompt out at the end of the section.

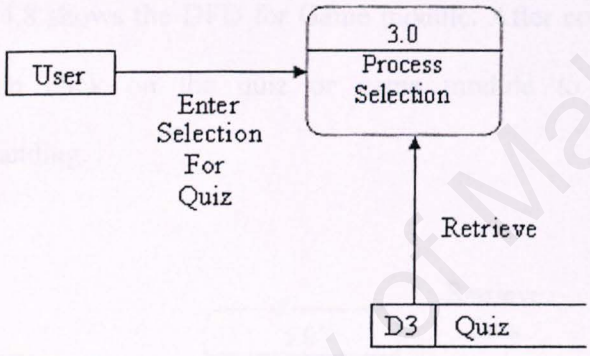


Figure 4.7 Data Flow Diagram (DFD) for Quiz Module

Figure 4.7 shows the DFD of a quiz module has been selected by user. User enters the section of the set of quizzes, the model of quiz retrieved from database. The questions of the quiz are generated randomly.

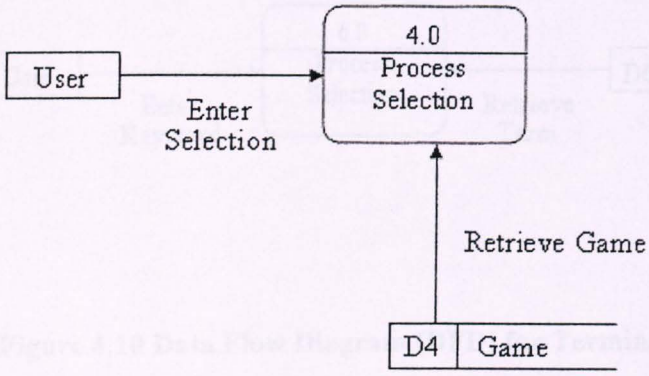


Figure 4.8 Data Flow Diagram (DFD) for Quiz Module

Figure 4.8 shows the DFD for Game module. After completing a topic, the user can click on the quiz or game module to test their level of understanding.

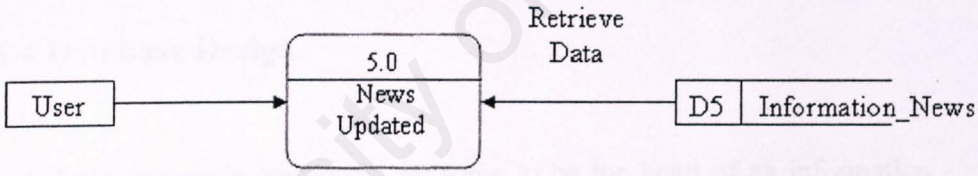


Figure 4.9 Data Flow Diagram (DFD) for Information & News Module

Figure 4.9 shows the DFD for Information & News Module. User are able to select the latest news have been uploaded. These updated news retrieve from the database Information_News.

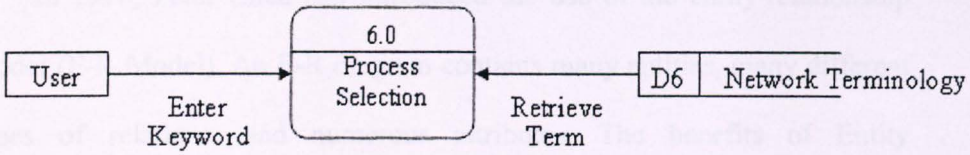


Figure 4.10 Data Flow Diagram (DFD) for Terminology Module

Figure 4.10 shows the DFD for Terminology Module. If the users face any difficulties in understanding any network terms, they can click terminology to seek help. The users have to click on the alphabet where the word began. If the word is not listed, the user will not be able to view the terms.

4.4 Database Design

Data storage is considered by some to be the heart of an information system (Kendall, 1996). It is a central source of data meant to be shared by many users for a variety of applications. The heart of a database is the DBMS (database management system), which allows the creation, modification and updating of the database; the retrieval of data; and the generation of reports. The main objective of database design is to make sure that data is available when the user wants to use it. Apart from that, the accuracy, consistency and integrity of data must be assured from time to time, to provide efficient data storage as well as efficient updating and retrieval.

In 1976, Peter Chen had introduced the use of the entity-relationship model (E-R Model). An E-R diagram contains many entities, many different types of relations, and numerous attributes. The benefits of Entity Relationship modeling are mentioned below:

i. Databases need to be designed and entity relationship (ER) modeling is an aid to design.

ii. An ER model is a graphical representation of the system and is a high-level conceptual data model.

iii. Supports a user's perception of data and is independent of the particular DBMS and hardware platform.

4.4.1 Data Dictionary

Data dictionary or metadata can be defined as descriptions of the database structure and contents. Data dictionary defines the field, field type and descriptions of each table.

In this project, one database had been defined namely LearningPackage and contained 7 tables, which are administrator_info, user_info, lesson_info, quiz_info, game_info, terminology_info, information_info, and help_info.

Database Name: **LearningPackage**

Table name: **administrator_info (D1)**

Table 4.1 : Table of administrator_info

Field Name	Data Type	Length	Note
Admin_id	varchar	10	ID of administrator
Admin_password	varchar	10	String of password

Table name : **user_info (D2)**

Table 4.2 : Table of **user_info**

Field Name	Data Type	Length	Note

User_id	varchar	10	ID of user
User_matriks	varchar	10	Matriks number of user
User_first_name	char	10	User's 1st name
User_last_name	char	15	User last name

Table name : **lesson_info (D3)**

Table 4.4 : Table of **lesson_info**

Field Name	Data Type	Length	Note
Lesson_code	Int	5	Code of the simulator
Lesson_title	Char	10	Title of simulator

Table name : **quiz_info (D4)**

Table 4.5 : Table of **quiz_info**

Field Name	Data Type	Length	Note
quiz_code	Int	5	Code of the quiz
quiz_title	Char	10	Title of quiz

Table name : **Game_info (D5)**

Table 4.6 : Table of **Game_info**

Field Name	Data Type	Length	Note
Game_code	Int	5	Code of the game
game_title	Char	10	Title of game

Table name : **Terminology_info (D6)**

Table 4.7 : Table of **Terminology_info**

Field Name	Data Type	Length	Note
Term_code	Int	10	Code of the terminology
term_title	Char	10	Title of the terms

Table name : **Help_info (D7)**

Table 4-8 : Table of **Help_info**

Field Name	Data Type	Length	Note
Help_code	int	10	Code of the Help file
help_descp	char	10	Description of the help

4.5 User interface design

To match the main objective of this project, which to develop a user friendly study tool to user, the main interface of the simulator and the main homepage are design with user friendly and attractive kind of design to maximum the interesting of user.

There are 2 types of interfaces in this system:

- **Main Interface**
- **Interface of Simulator**

4.5.1 Main Interface Design

This is the web based project; user will use or download the simulator or other study material through the main homepage. Therefore an interesting design has been created to fulfill this requirement. The standard layout of the website will guide the users to use the system effectively. Beside that, the hyperlinks in this system provide quick and easy reference for the users.

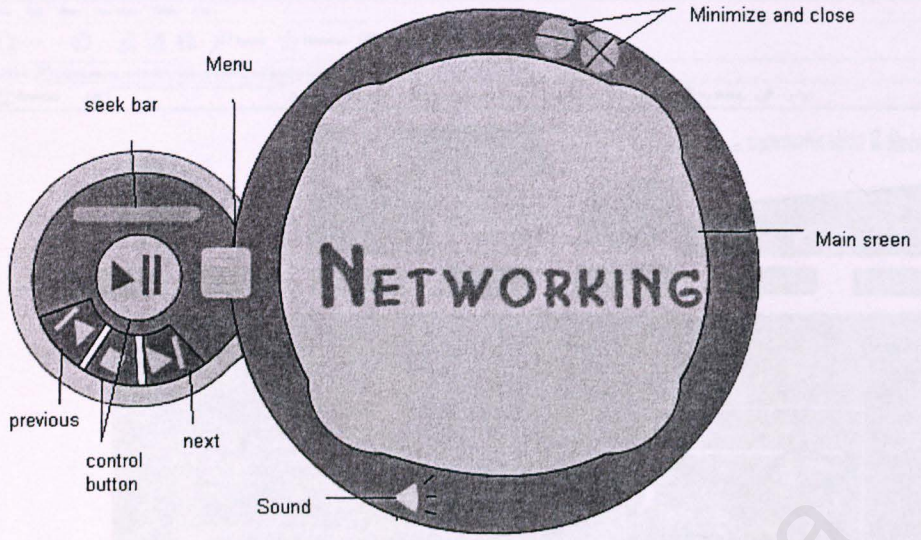


Figure 4.12 Interface Design for Simulator

There are 9 buttons designed with the function of:

- Seek bar – to select the position of the simulator when it's running.
- Menu – to select the other topics of the simulator.
- Control button – to stop, play or pause the simulator
- Previous –to go to previous simulator
- Next –to go to the next simulator
- And two buttons on the top of right to minimize or close the simulator

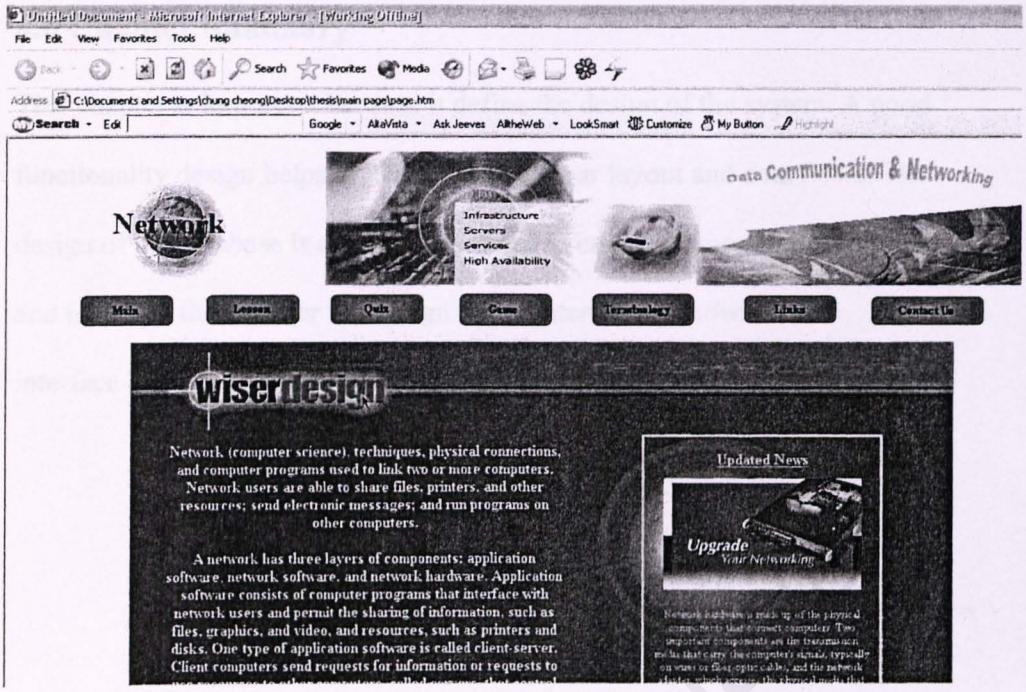


Figure 4.11 Interface Design of Homepage

4.5.2 Interface Design for Simulator

Simulator is the main study material that will be provided, therefore the design is user requirement oriented, the design of the interface is based on user friendliness, effective, and the content in a simulator. Bright colors, smooth color combination and the buttons are well assembling. The buttons are the control buttons, so that user can control the simulator with most easiness to interact with the simulator.

4.6 Chapter Summary

This chapter is important because it define the design of the system. A good functionality design helps system to have a clear layout and data flows. The design of the database is always considered to ensure a smooth data retrieve and insert. In this chapter the design of the interface is shown, a nice interface has to be emphasize before it deliver to the user.

CHAPTER 5

SYSTEM IMPLEMENTATION

Chapter 5: System Implementation

System implementation is a phase of integrating the designed modules or functions to develop a system based on the given requirements. It is the process that takes place after the system design phase. This phase describes how the initial and revised processes designs put into the real working environment. Therefore, system development, and development tools are included in this phase.

5.1 Development Environment

The development environment of Online Simulator of Learning Package for Networking Subjects consists of software and hardware configuration. Using the suitable hardware and software will help in speeding up the system development. The hardware and software tools that used to develop and document the system will be discussed as below:

5.1.1 Hardware Requirement

The hardware configurations used for developing the system are:

A computer with not less than 166Mhz processor

- At least 64 MB memory
- 4 GB of free hard disk space
- 36X CD-ROM drive
- Network Interface Card (NIC)
- Other standard computer peripherals

5.1.2 Software configuration

The software tools that have been used to develop Online Simulator of Learning Package for Networking Subjects are:

Software	Usage	Description
Microsoft Windows XP	System requirement	Operating System
Internet Information Service 5.0	System requirement	Web server service. Map local directory to virtual directory and create local web site.
Dreamwever MX	Interface design	Web page design
Flash MX	Animation design	Design tool
Microsoft SQL Server 2000	Database	Database Server to generate, view and edit database tables.
Microsoft Internet Explorer 5.0	System requirement	Browser to surf the site
Adobe Photoshop 6.0	Graphics editing	Graphics editing.
Microsoft Word	Document writing	Project documentation.

Table 5.1 Software Tools

5.2 System Development

The system development illustrated the user interface development and the database configuration.

5.2.1 User Interface Development

The user interface for Online Simulator of Learning Package for Networking Subjects was developed using Dreamweaver MX. Dreamweaver MX is the web page editor program that allows the user to edit HTML files, create linking to database and animation design. The system interface is consist of three zones, which are banner and buttons zone, information Zone, and Flash animation zone. Below is a figure describing the layout of the interface.

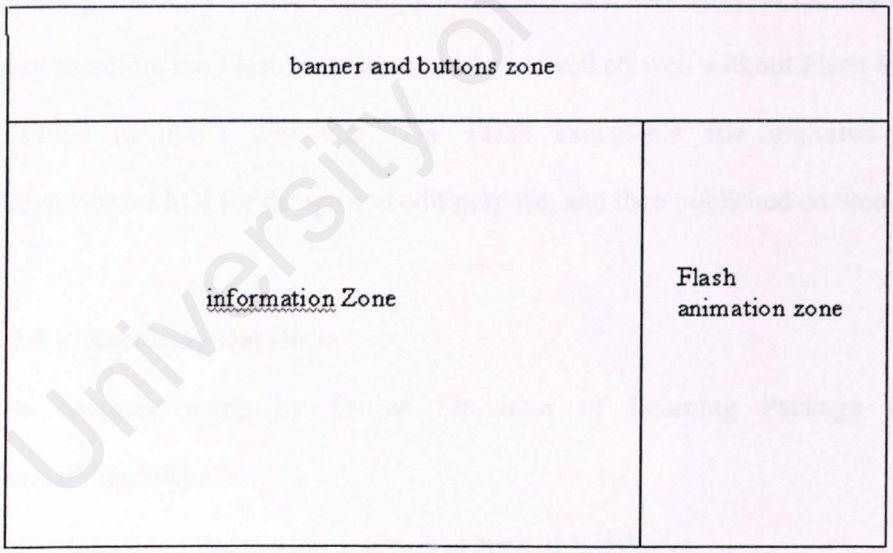


Figure 5.1 System Interface Layout

5.2.2 HTML (Hypertext Markup Language)

In Online Simulator of Learning Package for Networking Subjects, the Web-based interfaces are created using HTML. This programming tool is used

together in Dreamweaver MX design environment to enhance the features of the project. HTML is the fundamental building stuff of the web. HTML is the set of "markup" symbols or codes inserted in a file intended for display on a World Wide Web browser. It uses tags like <A> and </A> to structure text into tables, hypertext links interactive forms, headings, paragraphs, lists, and more. HTML is useful to create form based data entry for this application. Below are some HTML codes to create a form in this application.

5.2.3 Flash animation development

The simulator designed for the usage of simulator in the project is designed by using Flash MX. Each animation in Flash are then save in executable files, therefore the Flash animation can be viewed on web without Flash MX installed in user's computer. The Flash executable file imported in Dreamweaver MX for design and edit purpose, and then published on web.

5.2.4 Accessing Database

The database using by Online Simulator of Learning Package for Networking Subjects

The connection to accessing database is opened as follows:

```
<%
    String url = "jdbc:inetdae7://localhost/Online_Sulator";
    String Lesson = "lesson";
    DriverManager.setLogStream(System.out);
    Class.forName("com.inet.tds.TdsDriver").newInstance();
    DriverManager.setLoginTimeout(10);
    Connection conn = DriverManager.getConnection(url,lesson);
%>
```

5.2.5 Web Server

In Online Simulator of Learning Package for Networking Subjects deployment, the Internet Information Server (IIS) is used to make the system become more secure. IIS is an extremely fast Web server. It includes several protocols such as File Transfer Protocol (FTP) Server to upload and download files, Simple Mail Transfer Protocol (SMTP) for sending email and other protocols. For IIS to respond to requests, the server first strips the file extension from the filename before looks up the associated program and launches the program to return the file.

5.3 System Documentation

The process of development is documented since it is important to help developer to determine the progress of the project. The system documentation that provided in Online Simulator of Learning Package for Networking Subjects are:

5.3.1 User Manual

User manual is a reference or guide for system users. It wills explains and describes how the system can be use. It can reduce the learning curves of the system users and save their time.

5.3.2 Setup tools

This information about how to setup the tools that are using for Online Simulator of Learning Package for Networking Subjects development will be included. Those include are:

- Run Internet Explorer
- Installing SQL Server 2000

5.4 Summary

The most important things in the system implementation are development environment and system development. The development environment consists of hardware and software requirements. And the system development consists of database development, user interface development and application development. By using several guidelines in implementing and coding programs as discussed above does the system implementation of Online Simulator of Learning Package for Networking Subjects.

CHAPTER 6

SYSTEM TESTING

Chapter 6: System Testing

System testing is a significant and critical phase that ensures the system fulfills the user's requirements and assures the quality of the delivered system. Testing provides a method to discover logical error and to test the system reliability. It is done throughout system development, not just at the end. This is because system that is failed after installation will result a waste in cost, time and effort. However successful testing will result in quality software with less errors and work according to specification.

Several testing stages that involve during the development of the system are:

- Unit testing
- Integration testing
- System testing

6.1 Unit Testing

In this stage, testing will be concentrated on the smallest component of the system for testing. Each individual component is tested independently without other system components, to ensure that they operate correctly. For example, this component might perform task like checking valid input value.

In Online Simulator of Learning Package for Networking Subjects, those units that were tested independently are:

- Internet web browsing
- Flash animation loading

- Sound testing
- Visual Basic executable file testing
- Online document saving
- Execution of SQL statements

For Online Simulator of Learning Package for Networking Subjects unit level testing, there are three category types of testing were applied.

6.1.1 Ad Hoc Testing

Ad Hoc or ad lib testing means simply play with the functioning unit, trying whatever comes to their mind, in attempt to make it fail. This type of testing was a fast and efficient way of debugging code errors during the early development stage. The disadvantage of Ad Hoc testing is it usually finds many errors and never be sure what was or was not to be tested.

6.1.2 White Box Testing

White Box Testing basically involved analyzes the structure of the code and use knowledge about the structure of a component to derive test data. The advantage of white box testing is that an analysis of the code can be used to find out how many test cases are needed to guarantee a given level of test coverage. The code that were tested under this phase including basic path testing, data flow testing, path testing and loop testing. It is focused on the idea of coverage. The main objective is to check for missing function.

6.1.3 Black Box Testing

Black Box Testing is concentrate on the functionality of code. The main objective is to uncover those wrong functions programmed correctly by

feeding the input to the black box and take notes on what output is produced. The test object's behavior can only be determined by studying its inputs and the related outputs.

The advantage of this kind of testing is that a black box is free of the constraints imposed by the internal structure and logic of the test object. However the disadvantage is that it is not always possible to run a complete test in this manner. Those tests that tested during this phase are including boundary value analysis, error guessing and domain testing.

6.2 Integration Testing

After all components have been unit-tested, the next step is ensuring that the interfaces among the components are defined and handled properly. This step is called integration testing, also known as module testing, which verifies that the all the components work together as described in the module or system design specifications.

During the integration testing, two or more units in which either unit that use output data from or provide input data for another unit were tested in collection. These unit that have related characteristics to perform a common function like accessing game section that consists of Visual Basic statement generating.

The order in which components are tested affects our choice of test cases and tools. The system is viewed as a hierarchy of components, where each component belongs to a layer of the design. In this system, the Top-down

Integration approach is used where testing begins from the top and works the way down. The process is continued until all the modules are tested.

6.3 System Testing

System Testing is the last testing procedure. It is performed to uncover its limitations, measure it capabilities and make certain that the entire system works according to users specifications. Developers will join the users to perform this stage of testing where the system is checked against the users requirements description.

System modification will be implemented if there is a need to change or do not met the users' requirements specifications. If the users are satisfied with the system's characteristics, the system is ready to be deployed for use. The testing result will show whether or not the entire system specifications and objectives are achieved.

6.3.1 System Test Considerations

In system testing, the behavior of the individual functions and functional tests also involved:

- **The Event List**

All the possible triggers are exercised and the expected results compared with the actual results. Every function is tested by one or more events in the event lists.

- **Error Message Testing**

The error message, which can be generated by the system during invalid data entry are checked for spelling, appropriateness and consistence. Acknowledgement messages also will also implement the same test. It is the message that informs the user about the state of a user request process.

6.3.2 Documentation Testing

All examples used in the user's manual is tested for correctness and for whether or not the manual gives the exact answers users will obtain when they run the examples.

- **Transaction Tracking**

During transaction tracking, a list of possible transactions is tracked through the system to ascertain that they function correctly from input to output. For example, every time a screen is reached which requires input or generates input, the appropriate functions are processed and lead to subsystem for processing and then the right output is retrieve.

This test was implemented and all the function behaves according to the requirements specification.

6.4 Fundamental Tests (Product Verification Testing)

There are other tests fundamental to all software. Certain of these are difficult to measure accurately. Five of these fundamental tests are:

6.4.1 Usability

The usability should be based in building user interfaces that have patterns already familiar to the typical user. The user then learns to use the web-based program through pattern matching and paradigm shifts, exactly as they do in mastering any product.

6.4.2 Install Ability

It defines the easiness for a novice to install the software correctly and easily without recourse to an expert.

6.4.3 Performance

Performances tests are conducted to ensure that the system response time meet user expectations and do not exceed the specified performance criteria under heavy stress or volume. During these tests, response time and the transaction rate are measured, the purpose of performance tests is to test-run the performance of various functions of the software within a specified hardware configuration. The performance tests can couple this test with stress testing.

6.4.4 Reliability

Reliability tests are conducted, according to mathematical models of software reliability, to ensure that the system can be probability of some function of the system failing within a specified time. Reliability testing is monitoring the mean time between failures. Reliability and consistency testing go hand in hand where the system behavior (inputs, outputs, response time) is measured for consistency.

In conclusion, the testing steps are shown as below.

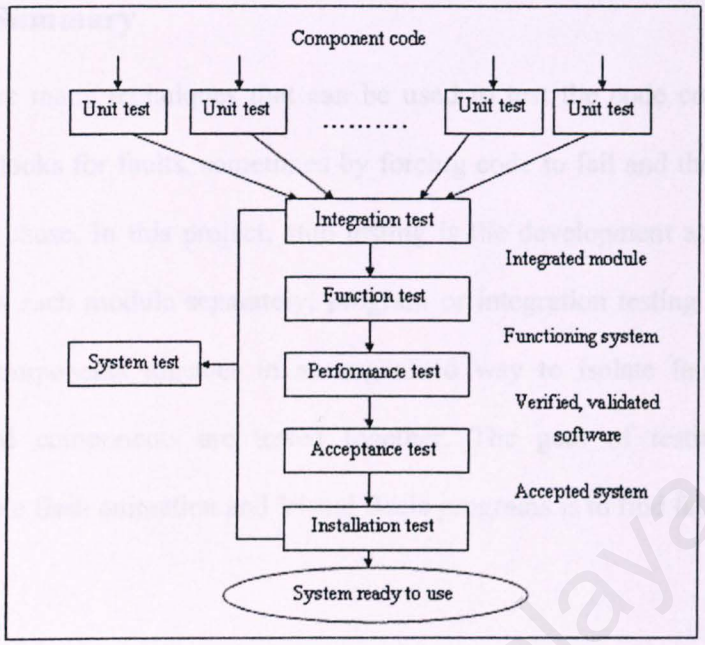


Figure 6.1 Testing Steps

6.5 System Maintenance

System maintenace will be conducted once the system is finished or delivered. The maintenace services will be make sure the system function properly, modify some application or add new functions in this system, such like adding new features of Flash animation in the lesson, new games for the user, networking news updating and etc.

6.6 Summary

There are many techniques that can be used to test the code components. Testing looks for faults, sometimes by forcing code to fail and then seeking the root cause. In this project, stub testing is the development activity that exercises each module separately; program or integration testing puts stub-tested components together in an organized way to isolate faults as the combined components are tested together. The goal of testing in the executable flash animation and Visual Basic programs is to find faults.

CHAPTER 7

SYSTEM EVALUATION

Chapter 7: System Evaluation and Conclusion

Evaluation is a process that occurs continuously at all phases of the system development. Evaluation phase was to determine the extent to which the system the expected outcomes have been realized, and the prescriptive value of the process where extraneous factors were taken consideration. Lastly, conclusion will be making for this system.

7.1 System Evaluation

Throughout the development of Online Simulator of learning Package, a number of problems were encountered. Below are the some section highlight the problem found during the development of the system and the solutions of it.

7.2 Problems Encountered and Recommended Solutions

In every project, the problems always occur during system development. Throughout this project, many problems have kept unfolding one after another as development work progressed due to many reasons.

7.2.1 During Analysis Phase

Problem encountered during analysis phase are as below:

7.2.1.1 Determining Scope of the System

Since there is less experience in developing system, it was hard to determine to which extent to define the scope of the system so that it can be completed

within the given time frame. However, this was overcame by analyzing and studying all of the capabilities provide by Flash MX, Dremweaver MX, Visual Basic 6.0, Java Script, and other technologies before determining the scope of the system.

7.2.2 During Design Phase

7.2.2.1 Time Constraint

There was not enough time to study, learn and produce the best solution of design in Semester 1. Mainly, this was cause by inexperience and insufficient knowledge of designing a system. Furthermore, time is needed to study and explore to Dreamweaver, HTML and SQL Server 2000 before knowing how to apply these technologies and design tool in the process of developing and solving problems.

7.2.3 During Implementation Phase

7.2.3.1 Lack of prior experience in selecting animation designing tool

There was a learning curve in understanding how the Flash MX works in designing animation to give a great performance in networking subjects education programs. Flash MX is a strong animation design tool, it's still less explores to it's function and capability in designing the animation, and the presentation of multimedia elements such as sound, movement and user interactive.

7.2.3.2 Problems on Installation

During implementation phase, there were a lot of problems on installing and configuring Windows XP, IIS, Flash MX and Visual Basic 6.0 and other tools before starting coding and designing. Some of the needed software and tools were successfully installed only after a few times of formatting and reinstallation. This is need to be avoid to ensure smooth execution, no system errors while system is running.

7.2.4 During Testing Phases

7.2.4.1 Not fully supported by different browser

The appearance of web pages is different on Internet Explorer 5 and Netscape Navigator and Communicator during the testing phase, such as different positioning of graphics, text, and tables on these web browsers. The main cause of these problems could not be detected.

7.3 System Strength

The system provides a user friendly learning environment for the students to have a good experience in learning networking subjects. It has some strength although IT does not have powerful features to some extent, but still it provide a learning program for those who interest in networking.

7.3.1 User-friendly interfaces

Online Simulator of Learning Package for Networking Subjects could be evaluated as a simple and easy use application. Furthermore, the interfaces of the system are consistent where a standard and systematic web page design is given. It also provides graphical based and direct interface for the user to have

the control of the system flow and deal with it by using buttons, select list and hyperlinks. So the user-friendly interfaces of Online Simulator of Learning Package for Networking Subjects will shorten the learning curves, reduces training costs and saves the times of the users.

7.3.2 System Transparency

System transparency refers to the condition where users do not need to know where the database resides, how the system is structured, how to retrieve from or insert records into the database. They are just need to know how to communicate with the user interface.

7.3.3 Reliable system with effective errors handling

Input of the users will be validated and verified to prevent the errors caused by invalid input. If there is any error or invalid input occurred, an error message is generated and displayed to inform the user about the error. For example re-enter the value of the answer will be prompt out when users input the incorrect answer in the quiz or game.

7.4 System Limitations

Despite some of the system strengths mentioned previously, there are limitations, which cannot be researched and developed due to time constraint and the lack of resource such as SQL Mail and search engine and sounds implementation.

The limitations are:

7.4.1 Not fully supported by different browser

Online Simulator of Learning Package for Networking Subjects is being developed using the Internet Explorer 5.0. Therefore, this has make some of the features or function may not being support, look differently or performed well by using lower version of Internet Explorer or using other browser.

7.4.2 Not support Learning with Voice Instruction

The Flash animation for the lesson module does not designed with audio instruction. Users do not provided with guidance in sound format which give instruction and description while explaining a lesson.

7.4.3 User Cannot Insert Question for Quiz

Users do not have authentication to insert or upload new question in the quiz provided on web. The current database was not well established to support such features.

7.5 Future Enhancement

The program of Online Simulator of Learning Package for Networking Subjects provides users with a effective learning tool from which to evolve. Here are some suggestions of future enhancement for the system.

7.5.1 Encryption and decryption of password.

Password should be encrypted before store in database and decrypted during password retrieval process.

7.5.2 Support multiple languages

Online simulator of learning package for networking subjects can be enhancing to provide two languages that are in Malay Version and English Version to fulfill the different users requirements.

7.6 Project Conclusion

Online Simulator of Learning Package for Networking Subjects has been developed throughout two semesters, it is not completely featured to be an excellent learning tool, but as a animation designed oriented learning program, it helps users to gain experiences in studying networking subjects.

The system has it's own drawbacks and strengths, the security features need to be enhance and the user interactive features need to be re-consider and design. However, users are able to get benefits from the free service and learning tools provided which are equipped with standard networking contents and certified examination question.

Finally, the project has been a good practical testing on undergraduates' capabilities in handling and developing a project. It provides the opportunity for them to apply and gained knowledge to a real world environment.

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[12] http://ip158.fsktm.um.edu.my

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[14] Interactive

lecturing:http://www.swap.ac.uk/approaches/Interactive1.asp

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[16] http://www.oracle.com

[17] http://www.cisco.com

[18] http://www.boson.com

USER MANUAL

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Chapter 1: Introduction

The system of Online simulator of learning package for networking subjects is a easy to use web-based program. Users can check their progress and understanding to networking via the online simulator which provides lessons online, and also has a opportunity to test their understanding via the quizzes or games easily and effectively.

This project focused on a set of web based tools and programs with networking related issues, which is an online simulator of learning package for networking subjects. The other learning tool such like the quiz and game designed by using Visual Basic are very helpful for the users.

This online Simulator are well designed for the use of students who encounters problem in networking. Users may go online and download the study materials to enhance their knowledge and understanding in networking. The Online Simulator of learning Package is multimedia learning package that will guide the users or students to learn the networking subjects step by step. It is easy to use and learn, featured with user friendly design and easy to access.

Chapter 2: Getting Started

2.1 Homepage

The Online Simulator of learning Package is a web application that provides learning services to networking subjects to users. Users can access the Internet and browse to the lessons, quizzes and game that they want with the web browser. Figure 2.1 below illustrated the homepage of The Online Simulator of learning Package.

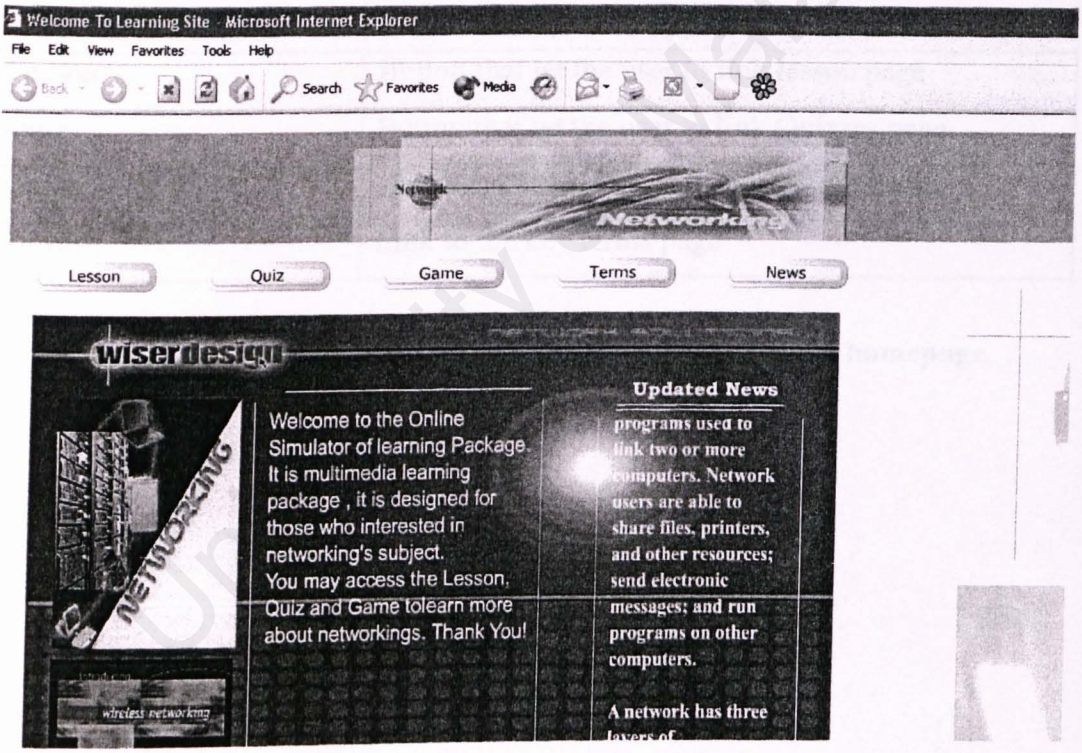

Figure 2.1 Homepage of The Online Simulator of learning Package

The main homepage displayed updated news relates to networking world. Users are able to click the links provided on the page to enter its details. There is a banner put at the top of page that featured with animation and audio. It makes the homepage more attractive to view. The navigation bar at below of the banner shows a few buttons that can let users to choose to go to other pages. For instance, users can click the lesson button which link to the lesson page for choosing the lesson topic that they want to view.

Button	Function
Lesson	Button that let the user to link lesson page
Quiz	Button that let the user to link Quizzes page
Game	User can click this button to view the game
Terms	Link to the key terms page

Table 2.1 shows the function of buttons at the top of the homepage.

Chapter 3: Lesson

3.1 Lesson Module

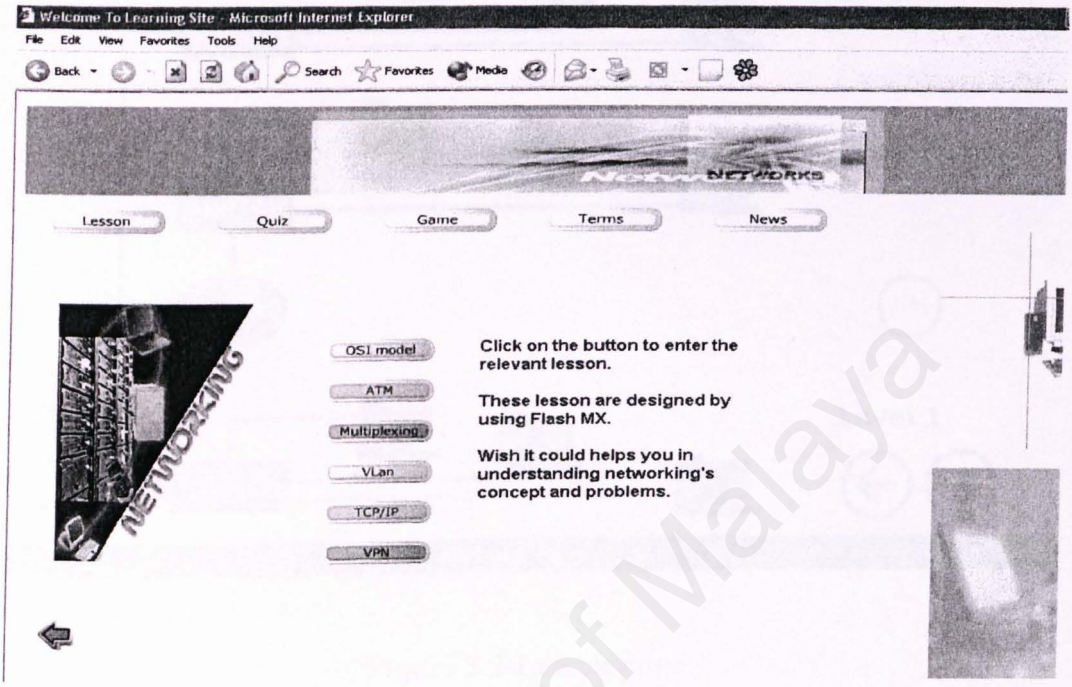

Figure 3.1 The Web page of lesson page

The Web page of lesson page consists of several buttons that let the users to choose the topic of networking subjects. The topics are OSI model, ATM, Multiplexing, VLAN, TCP/IP and VPN.

Users are free to click the button to prompt the lesson that they want to view.

In this page, there is a previous button provided at the left corner side of the page. This button let the users to go back the homepage.

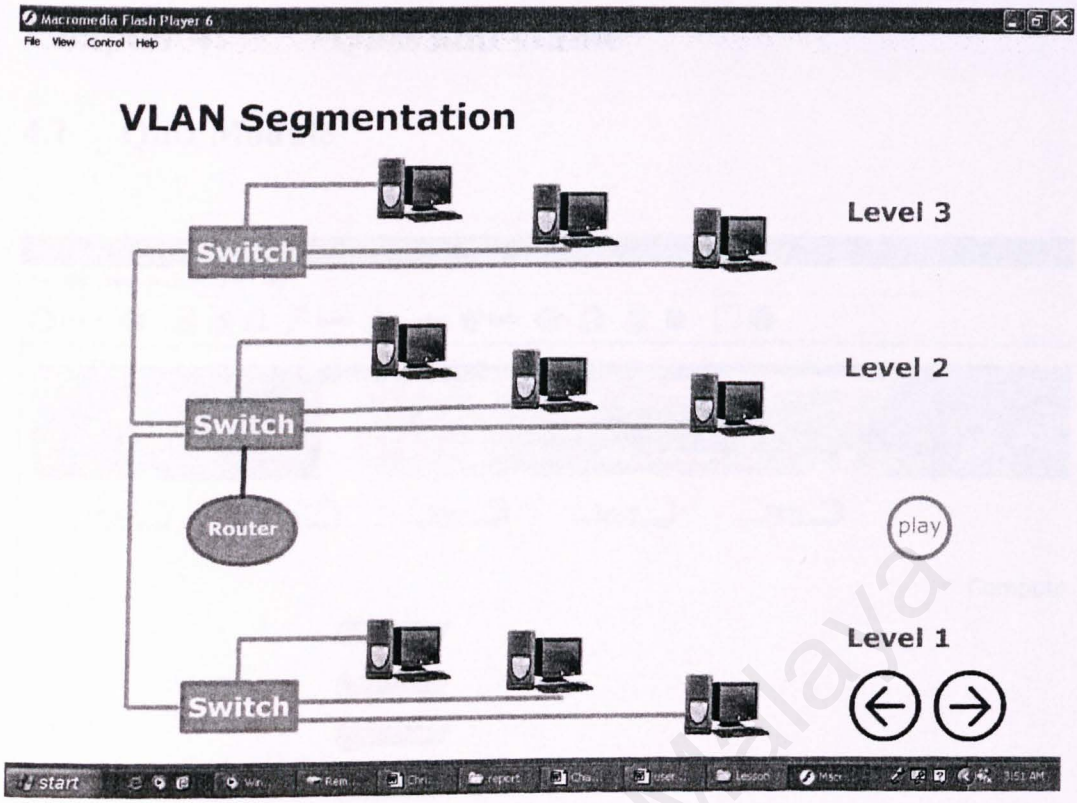

Figure 3.2 Lesson page

When the users click the topic button in the Web page of lesson page, the related lesson will prompt at the center of the page.

The lesson page consists of several buttons with its functions:-

- Home Button – let the user to go back to first page of lesson
- Forward Button – to view next page
- Previous Button – to view previous page

Chapter 4: Quiz and Game

4.1 Quiz Module

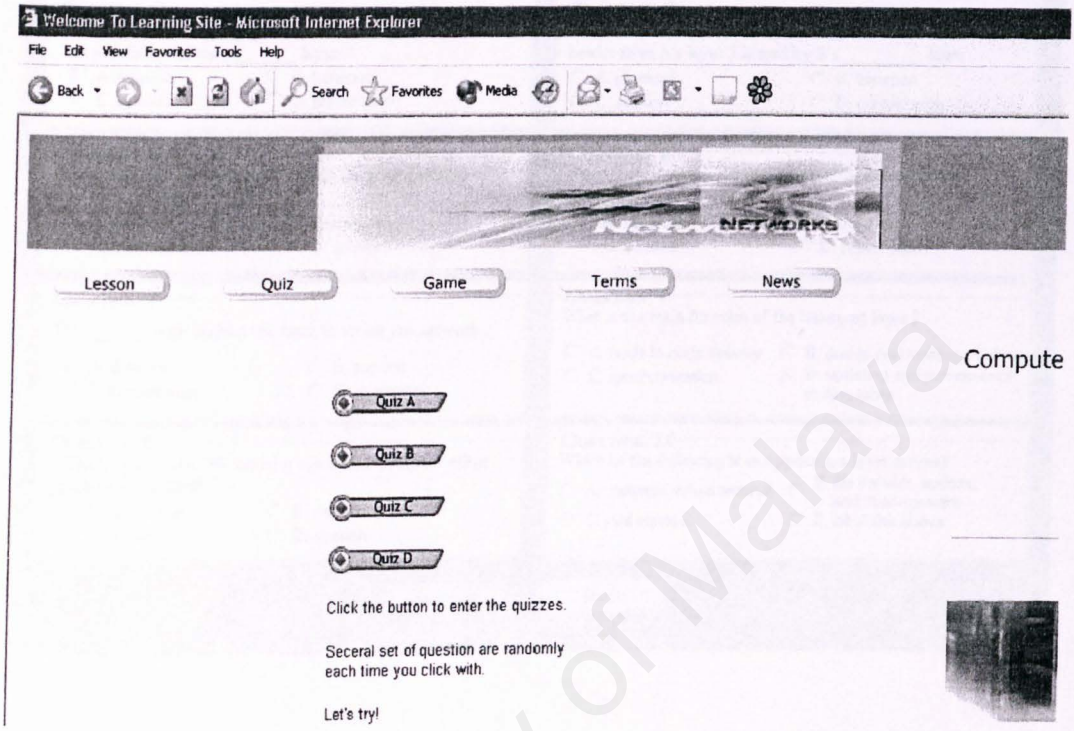

Figure 4.1 The web page of Quiz

The Web page of Quiz consists of several buttons that let the users to choose the different quizzes according to the lesson's topic.

The users just need to click the button to prompt the quiz that they want to view.

In this page, there is a previous button provided at the left corner side of the page. This button will point users to go back the homepage.

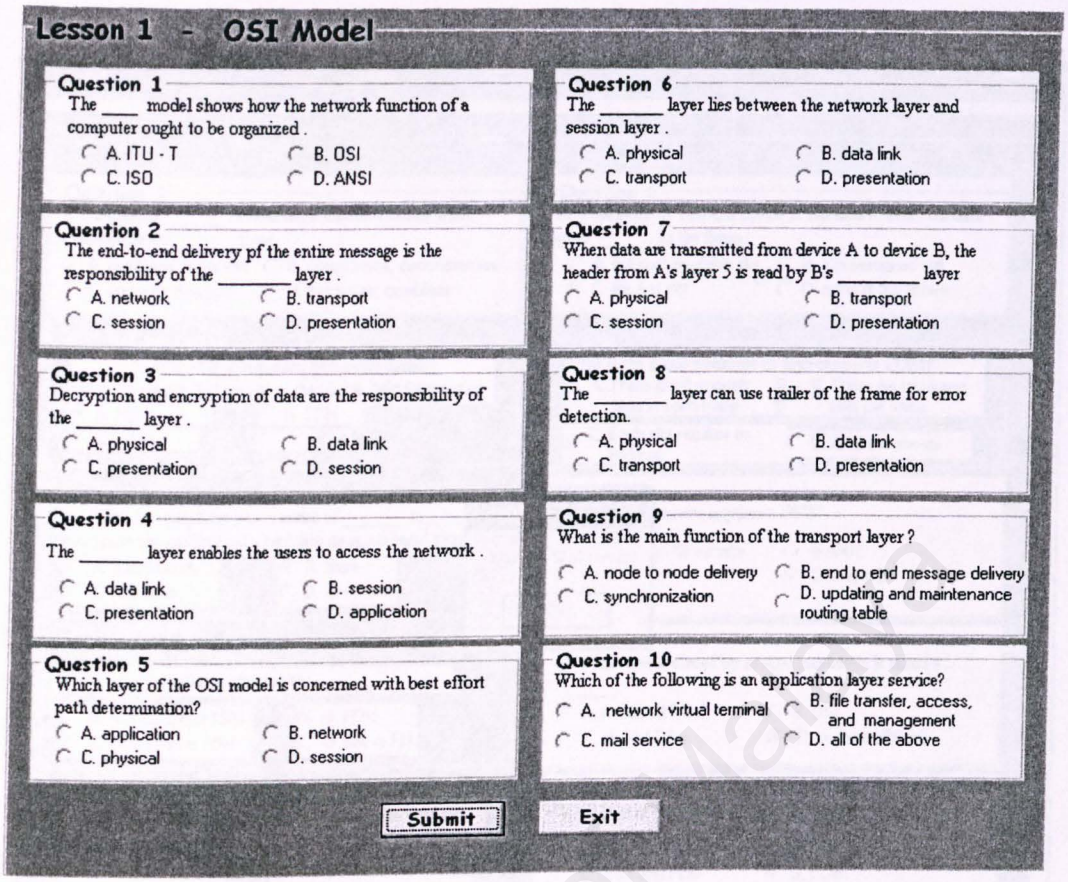

Figure 4.2 Layout of quiz

There are 10 questions generated randomly in the quiz each time when users load the quiz file. The users will not get the exactly same question when they run the quiz at the next time. The users just need to fill in the answer for each question and than click the submit button.

The system will tell the users about how many questions and which questions are correct.

The users can try again the question with other answers until they get the correct answer.

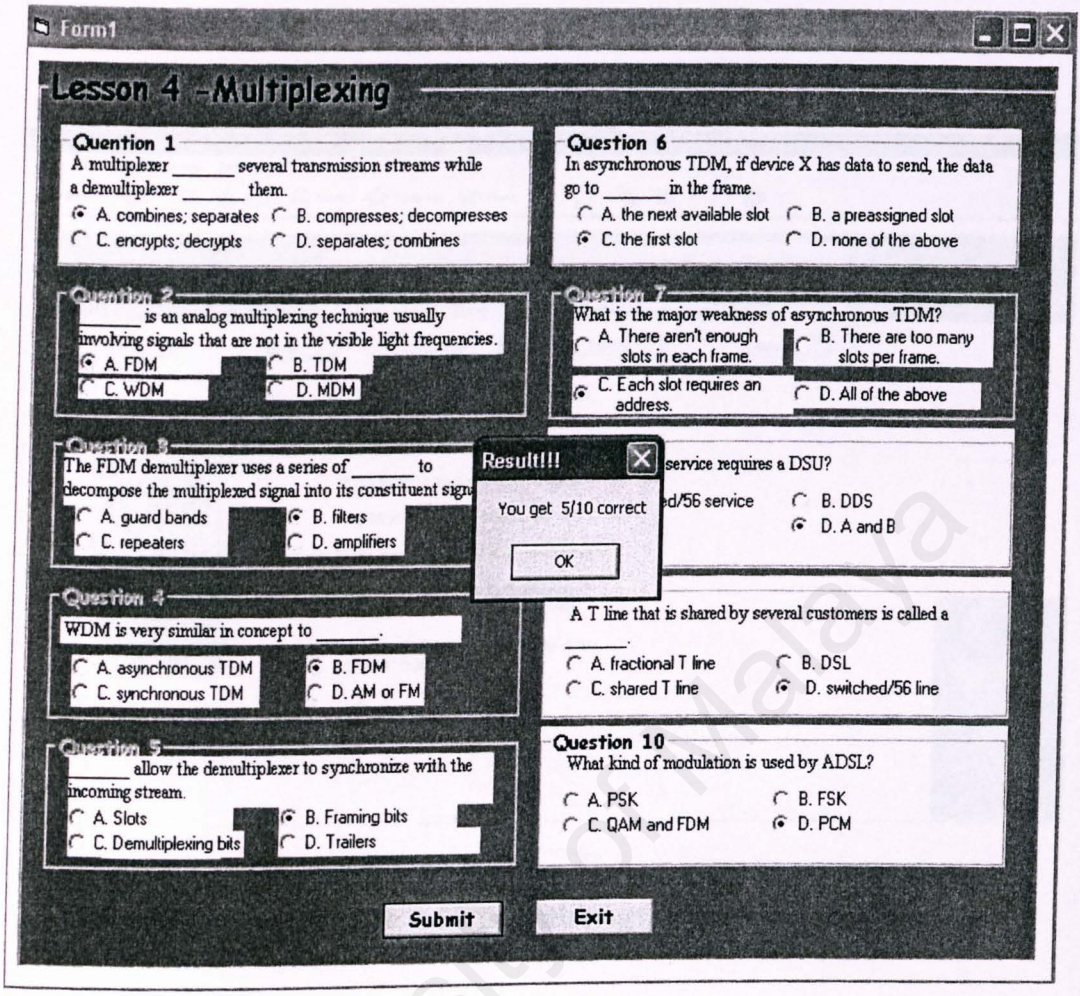

Figure 4.3 Layout for quiz's result

After the users clicked the submit button, a message box will prompt out at the center of the screen to tell the users the result of the quiz.

For above instance, the user has got 5 questions correct which are filled with green color. For the incorrect questions (white color), the users can change other possible answer by just click to other ratio buttons.

4.2 Game Module

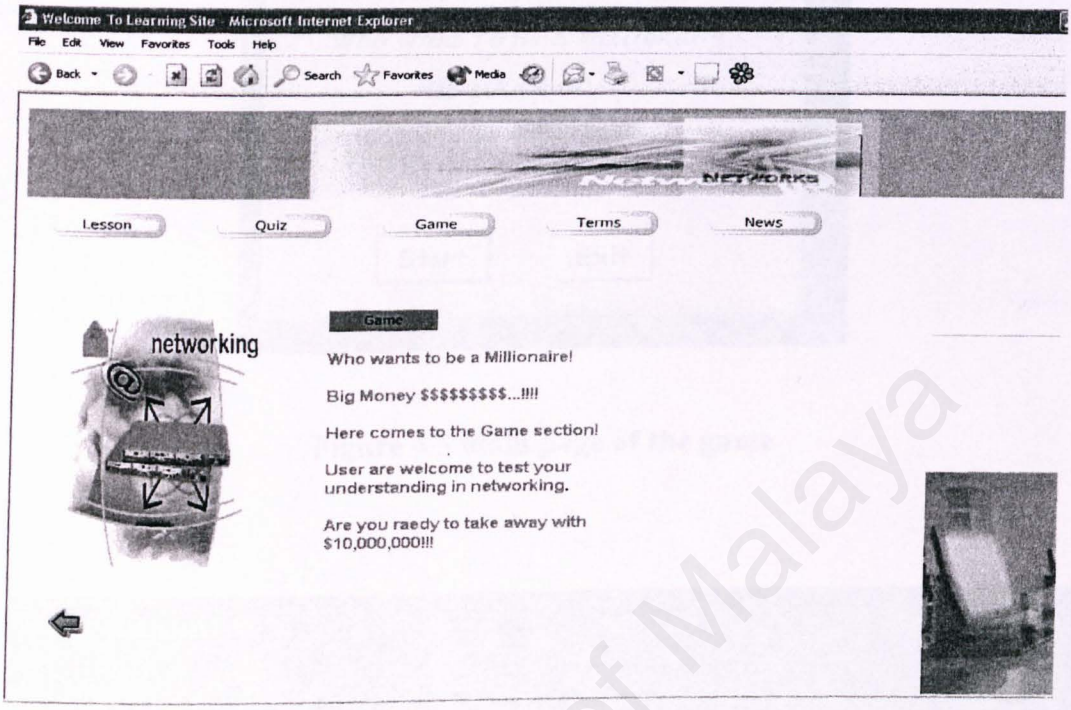

Figure 4.4 The web page of game

In the Web page of game, there is a red color button to let the user click for prompt the game.

In this page, there is a previous button provided at the left corner side of the page. This button let the users to go back the homepage.

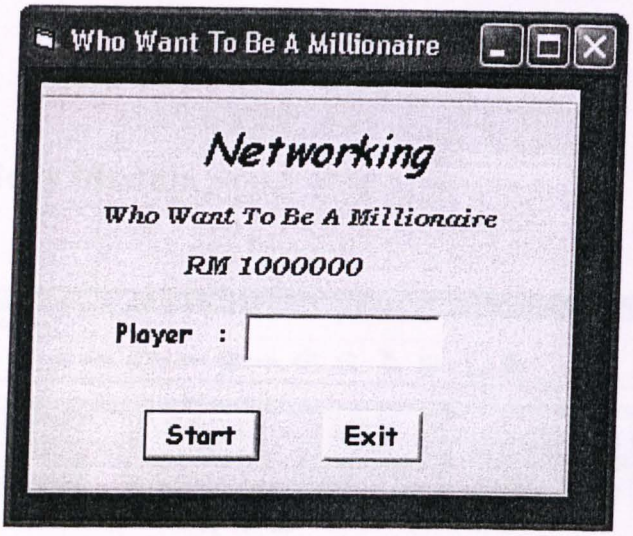

Figure 4.5 main page of the game

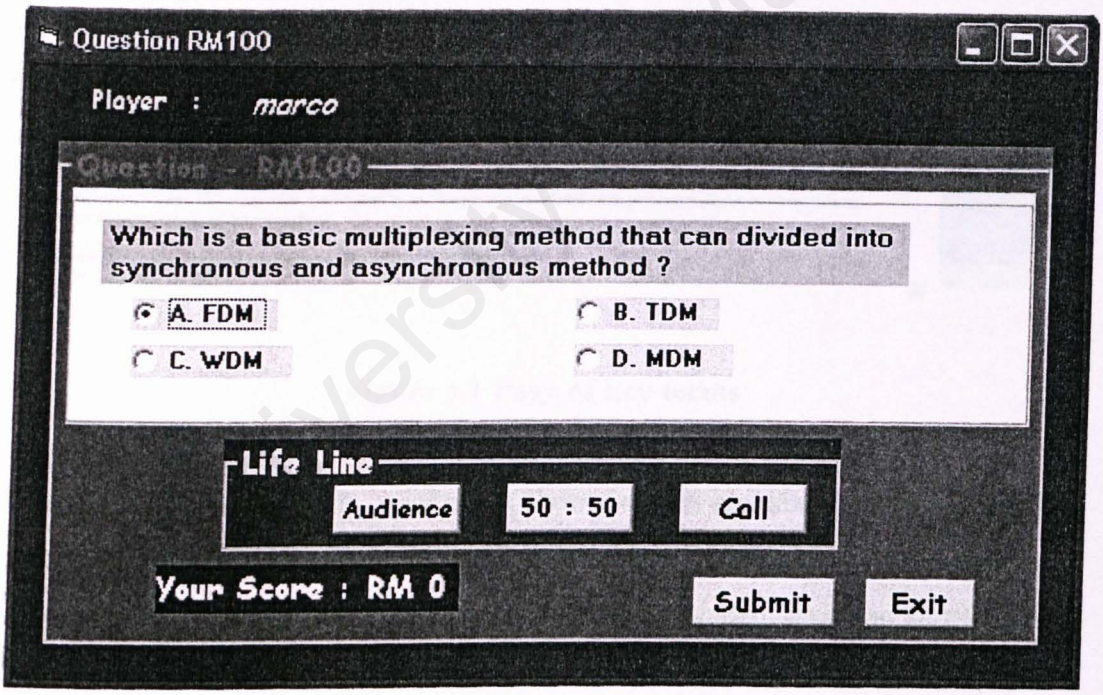

Figure 4.6 Example form of the game

Chapter 5: Terminology and News

5.1 Terminology Module

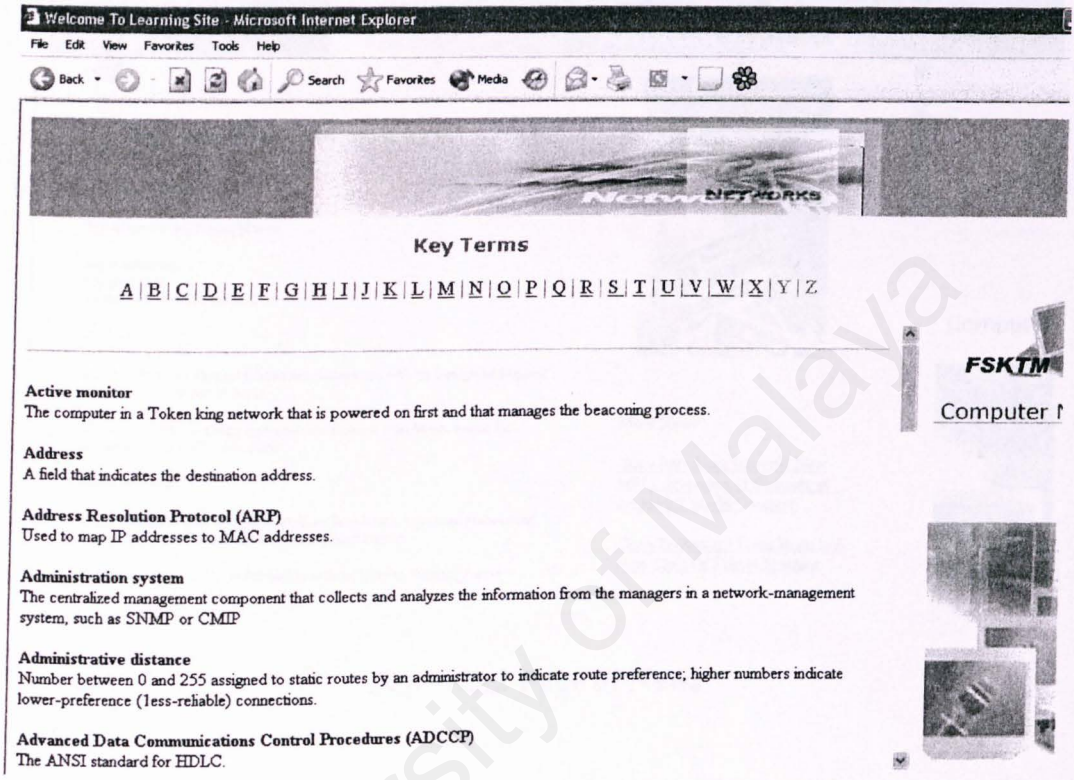

Figure 5.1 Page of key terms

There is a list of alphabets to let users choose which alphabet that contained the information or the terms that user not understands. If users clicked the alphabet 'A', some key terms start with 'A' will appear on screen, user can scroll down and look for the relevant terms.

5.2 News & Information Module

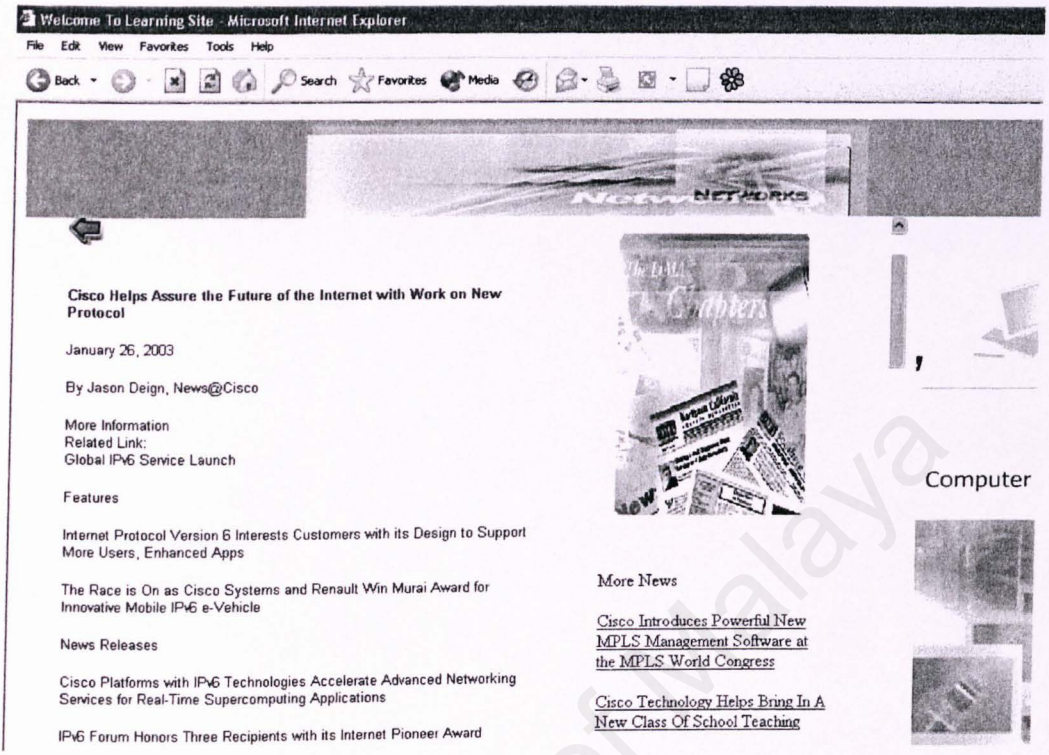

Figure 5.2 Page of News

There are several news uploaded on the web page. These news are networking related, latest and updated news. It works as extra issue for users to update their knowledge against networking.